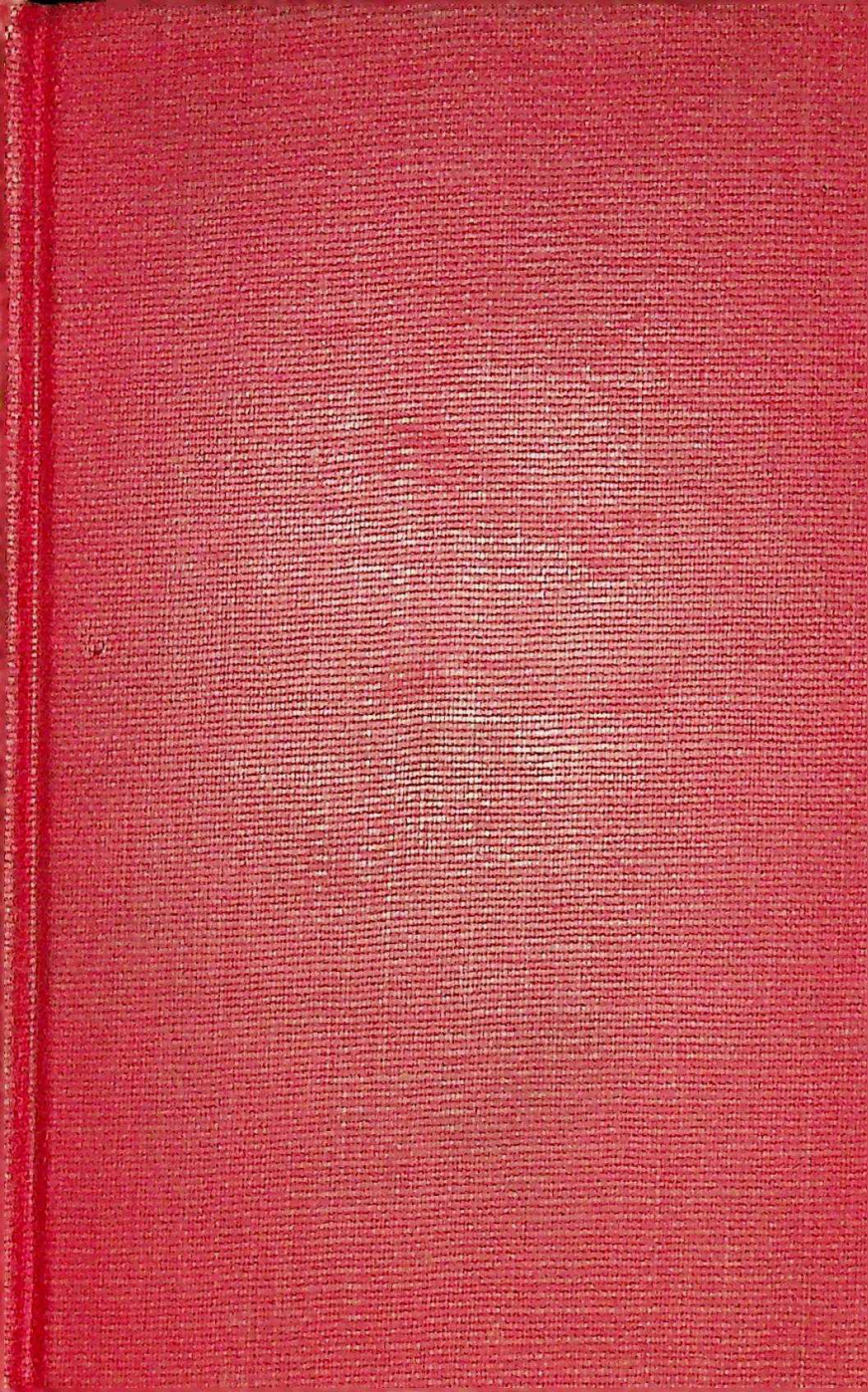
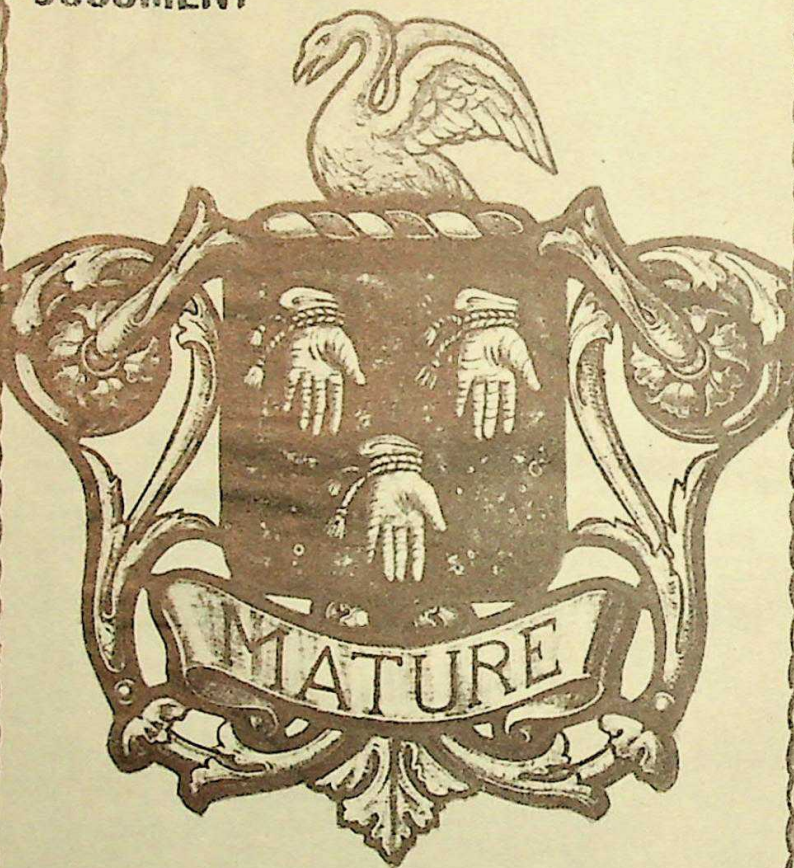




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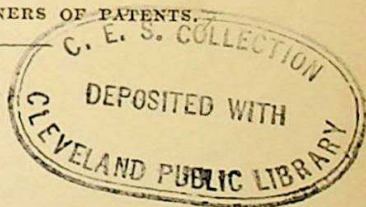
OF THE

Specifications

RELATING TO

STEAM CULTURE.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.



LONDON:

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PREFACE.

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THE Indexes to Patents are now so numerous and costly as to be placed beyond the reach of a large number of inventors and others to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Subject-matter, Reference, and Alphabetical Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the latter are sold have been added.

Many Specifications being yet unpublished, the only guide in discriminating subjects in such cases has been the titles of Patents, which are frequently defective, and may therefore have led to an occasional omission.

When the entire series of Specifications shall have been printed it is intended to publish a new and complete edition of these Abridgments; meanwhile, the manifest usefulness of such works, and the urgency of the demand for copies, have been considered a sufficient justification for the present issue.

The present series of Abridgments of Specifications relating to "Steam Culture" comprises not only the inventions which have for their object the employment of steam-power for cultivating the soil or performing the field operations of agriculture, but also those inventions which are indirectly connected with the subject. In the latter class are included the working of agricultural implements by electricity, explosive agents, heated air, compressed air, wind, atmospheric pressure, or water-power; also the various plans of communicating motion to carriages or agricultural implements which have been subsequently adopted in steam culture, as by grooved pulleys travelling along or in contact with fixed or slowly moving ropes or chains, propelling screws, differential pulleys, winding up ropes or chains, &c.; likewise such improved forms of implements or machines as might be or have been adapted to till the soil by the agency of steam, as revolving harrows, cultivators, and clod-crushers, portable or travelling agricultural engines, digging-machines, &c.

B. WOODCROFT.

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[The names of persons by whom inventions have been communicated from abroad, when known, are printed in *Italic*.]

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## STEAM CULTURE.

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A.D. 1618, January 17.—N<sup>o</sup> 6.

RAMSEY, DAVID, and WILDGOSSE, THOMAS.—“Newe, apte,  
“or compendious formes or kind<sup>e</sup> of engines or instrument<sup>e</sup> and  
“other pfitable inven<sup>ti</sup>ons, wayes, and meanes for the good of  
“our commonwealth, as well to ploughe ground<sup>e</sup> without horse  
“or oxen, and to enrich and make better and more fertill as well  
“barren peat<sup>e</sup>, salt<sup>e</sup>, & sea sand<sup>e</sup>, as inland and upland  
“ground<sup>e</sup>, within our kingdomes of England and Ireland, and  
“our domynyon of Wales; as alsoe to rayse waters from anye  
“lowe place to highe places for well watering of cittyes, townes,  
“noblemen’s and gentlemen’s houses, and other places nowe  
“much wanting water, with lesse charges than ever hath bene  
“heretofore; and to make boates for the carryage of burthens  
“and passengers runn vpon the water as swifte in calmes, and  
“more saff in stormes, then boat<sup>e</sup> full sayled in greate wyne.”

[No Specification enrolled. Letters Patent printed, price 3*d*.]

A.D. 1627, August 6.—N<sup>o</sup> 39.

BROUNCKER, WILLIAM; APRICE, JOHN; and PARHAM, WILLIAM.—“A most readye and easy way for the earing,  
“ploughing, and tilling of land of what kind soever without the  
“vse or helpe either of oxen or horses, by the labour or helpe of  
“twoe men onely to goe with everie plough that shalbe vsed, with  
“an engyne or gynn for that p<sup>ro</sup>pose.”

[No Specification enrolled. Letters Patent printed, 3*d*.]

A.D. 1630, January 21.—N<sup>o</sup> 50.

RAMSEY, DAVID.—“To multiplie and make saltpetre in an  
“open feilde in fower acres of ground sufficient to serve all our  
“dominions; to raise water from lowe pitt<sup>e</sup> by fire; to make any

“ sort of mill<sup>e</sup> to goe on standing waters by continuall mo<sup>o</sup>con,  
 “ without the helpe of winde, waite, or horse; to make all sorts  
 “ of tapestrie without any weaving loom, or way ever yet in vse  
 “ in this kingdome; to make boates, shippes, and barges to goe  
 “ against stronge winde and tyde; to make the earth firtile more  
 “ then vsuall; to rayse water from low places, and mynde and  
 “ coalepitt<sup>e</sup>, by a new waie never yet in vse; to make hard iron  
 “ soft, and likewise copper to bee tuffe and soft, which is not in  
 “ vse within this kingdome; and to make yellow wax white verie  
 “ speedily.”

[No Specification enrolled. Letters Patent printed, 4*d*. See also No. 6.]

A.D. 1634, January 29.—N<sup>o</sup> 68.

RAMSEY, DAVID.—“ A farre more easie and better waye for  
 “ soweing of corne and grayne, and allsoe for the carriage of  
 “ coaches, carts, drayes, and other thing<sup>e</sup> goeing on wheelles, then  
 “ ever yet was vsed and discovered.” On comparing the above  
 with the titles of Letters Patent Nos. 6 and 50, it seems probable  
 that the inventors purposed to plough or break up land and  
 deposit manure and seed by steam power.

[No Specification enrolled. Letters Patent printed, 4*d*. See also Nos. 6  
 and 50.]

A.D. 1634, July 17.—N<sup>o</sup> 72.

PARHAM, WILLIAM; PREWETT, JOHN; PREWETT, AM-  
 BROSE; and DORNEY, THOMAS.—“ A certaine newe and readie  
 “ way, for the good of our cōmon wealth, for the earinge and  
 “ plowinge of land of what kind soever, without the vse or helpe  
 “ of horses or oxen, by meanes of an engine, by them newly  
 “ invented and framed, and not formerly practized or vsed within  
 “ our kingdome of England or dominion of Wales, by the labour  
 “ and strength of two men onlie to drive or enforce the saide  
 “ engine, and of one other pson to hould or guide the plowe or  
 “ sullowe to be drawne with the same engine.”

[No Specification enrolled. Letters Patent printed, 4*d*. See also No. 39.]

A.D. 1769, March 14.—N<sup>o</sup> 921.

MOORE, FRANCIS.—“ New machines or engines made of wood,  
 “ iron, brass, copper, or other metal, and constructed upon peculiar  
 “ principles, and capable of being wrought or put in motion by



“ fire, water, or air, with a small assistance of horses or manual labour ; and which machines or engines, upon repeated tryals, he hath discovered will be very usefull in agriculture, carriage of persons, goods, and navigation ; that he humbly conceives that the said machines or engines will be of great utility to our subjects in tilling, improving, and cultivating lands, and also in the carriage of persons, goods, wares, merchandizes, and other things, either in coaches, chariots, carts, waggon, or other carriages, and likewise in navigation, by causing ships, boats, barges, and other vessels to move, sail, or proceed with more swiftness or dispatch.”

As the patentee did not enrol a Specification, no description can be given of the invention. The following letter respecting it appeared in the *Mechanics' Magazine* of November 26, 1831, vol. 16, page 135 :—“ Sir,—The following very remarkable paragraph I extract from the *Leeds Mercury* of April 11, 1769, now upwards of sixty years ago :—‘ A correspondent writes that Mr. Moore’s new invented machine to go without horses, for which he has obtained His Majesty’s patent, is not only adapted to wheel-carriages in general, such as coaches, chaises, carts, waggons, &c., but to plowing, harrowing, and every other branch of husbandry, as also to all other machines and engines now in use throughout the kingdom, in various branches of manufacture wherein draught horses are now employed. We hear that the ingenious inventor has sold all his own horses, and by his advice many of his friends have done the same, because the price of that noble and useful animal will be so affected by his new invention, that their value will not be one-fourth of what it is at present.’ Perhaps some of your well-informed correspondents can favour us with an account of the machine that was to effect such wonders. It would be a matter of curiosity, if not of instruction, to compare Mr. Moore’s invention with the more recent efforts in the same line, and to trace the causes to which its failure was owing. Yours, &c., J. Hopkinson.”

[No Specification enrolled. See *Leeds Mercury* of April 11, 1769 ; and *Mechanics' Magazine*, vol. 16, p. 135.]

A.D. 1769, June 19.—N° 930.

MOORE, FRANCIS.—“ New multiplying leavers or additions of power, that will expedite, facilitate, quicken, and reduce vibra-

“ tion, by which power is gained without a proportionable loss  
 “ of time, superior to what hath been yet practised, and far beyond  
 “ the common rule in mechanism ; and which multiplying leavers  
 “ or additions of power, upon repeated tryals, he hath discovered  
 “ will be of great utility in agriculture, carriages, navigation, mills,  
 “ machines, engines, and other things where mechanical powers  
 “ are or can be used. That he humbly conceives that the said  
 “ new multiplying leavers or additions of power will be of great  
 “ utility to our subjects in tilling, improving, and cultivating  
 “ lands, and in the carriage of persons, goods, wares, merchandizes,  
 “ and other things, either in coaches, chariots or chaises, waggons,  
 “ or other carriages, and also in navigation, by causing ships,  
 “ boats, barges, and other vessels to move, sail, or proceed with  
 “ more swiftness or dispatch, and likewise in mills, machines,  
 “ engines, and other things where mechanical powers are or can  
 “ be used.”

[No Specification enrolled. See also No. 921.]

A.D. 1769, July 13.—N<sup>o</sup> 933.

MOORE, FRANCIS.—“ New machines or engines made partly  
 “ of wood, and partly of iron, brass, copper, or other metal, and  
 “ constructed upon peculiar principles, capable of being wrought  
 “ or put in motion by force or power, without being drawn by  
 “ horses or any other beasts or cattle ; and which machines or  
 “ engines, upon repeated tryals, he hath discovered will be very  
 “ usefull in agriculture, carriage of persons and goods, and also  
 “ in navigation. That the petitioner humbly conceives that the  
 “ said new machines or engines will be of great utility to our  
 “ subjects in tilling, improving, and cultivating lands, and also  
 “ in the carriage of persons, goods, wares, merchandizes, and  
 “ other things, either in coaches, chariots, chaises, carts, waggons,  
 “ or other carriages, and likewise in navigation, by causing ships,  
 “ boats, barges, and other vessels to move, sail, or proceed with  
 “ more swiftness or dispatch than usual.”

[No Specification enrolled. See also Nos. 921 and 930.]

A.D. 1770, February 5.—N<sup>o</sup> 953.

EDGEWORTH, RICHARD LOVELL.—“ Portable railway or  
 “ artificial road, to move along with any carriage to which it is  
 “ applied.” This invention is introduced into the present series  
 of Abridgments, because it has been suggested that the patentee



purposed to apply it to agricultural implements and vehicles, and moreover several plans of a like nature are to be found amongst the various schemes for tilling land by steam power. The invention is thus described by the patentee:—"My invention consists in making portable railways to wheel carriages, so that several pieces of wood are connected to the carriage, which it moves in regular succession, in such manner that a sufficient length of railing is constantly at rest for the wheels to roll upon, and that when the wheels have nearly approached the extremity of this part of the railway, their motion shall lay down a fresh length of rail in front, the weight of which in its descent shall assist in raising such part of the rail as the wheels have already passed over; and thus the pieces of wood which are taken up in the rear are in succession laid in the front, so as to furnish constantly a railway for the wheels to roll upon."

The above description does not clearly explain the construction of the "portable railway," and the Specification is not furnished with a drawing. It appears probable, however, from the following circumstances, that the pieces of wood above alluded to were connected together in such manner as to form an endless chain or series:—In Vol. 1. of Edgeworth's Memoirs, page 169, it is stated,—"Even the method of locking carriages in turning, invented by Dr. Darwin, and by me, had been employed in a sailing carriage, described in the 'Machines Approuvées' of the French Royal Academy." And at pages 170 and 171—"After having made a number of models of my machine that should carry and lay down its own road, I took out a patent to secure to myself the principle; but the term of my patent has been long since expired, without my having been able to unite to my satisfaction in this machine strength with sufficient lightness, and with regular motion, so as to obtain the advantages I proposed. As an encouragement to perseverance, I assure my readers that I never lost sight of this scheme during forty years; that I have made considerably above one hundred working models upon this principle, in a great variety of forms; and that although I have not yet been able to accomplish my project, I am still satisfied that it is feasible. The experience which I have acquired by this industry has overpaid me for the trifling disappointments I have met with; and I have gained far more in amusement than I have lost by unsuccessful labor. Indeed the only mortification that affected me was my discovering,

“ many years after I had taken out my patent, that the rudiments  
 “ of my whole scheme were mentioned in an obscure memoir of  
 “ the French Academy.”

Now at page 33 of vol. 3 of the “*Machines Approuvées par l'Académie Royale des Sciences*” there is a description of a sailing carriage which, in the act of turning, rests upon four points of support, like the carriage invented by Dr. Darwin and Mr. Edgeworth; and at page 7 of the same volume there is an account of a truck or low carriage for heavy weights, provided with small rollers or wheels, which travel upon an endless chain of rollers. It is therefore most likely that the latter description is the “obscure memoir” referred to by Mr. Edgeworth.

For other inventions of like character to the above, see the series of Abridgments entitled “*Aids to Locomotion.*”

[Printed, 3d. See Rolls Chapel Reports, 6th Report, p. 160.]

A.D. 1785, January 28.—N° 1461.

VAN THORNHOFF, RAYMOND.—“ Machine for digging up  
 “ of ground in a much more cheap and expeditious manner than  
 “ any hitherto practised, and by the help of which upwards of  
 “ thirty-six square rods or poles of land may be dug by one man  
 “ in the space of twelve hours.” Although this machine is worked  
 by manual labour, it is introduced here because its action is  
 similar to that of some of the steam digging machines subsequently  
 invented. It consists of two spades, the straight helves or handles  
 whereof are connected at the top by a cross bar of wood, formed  
 with a handle at each end, to be grasped by the operator. An  
 iron rod or axis extends through the lower part of the helves, and  
 through a middle piece or block of wood placed between them,  
 from which a beam projects forward and is attached to an axis  
 furnished with a small pair of running wheels. The mode of  
 using the machine is thus described by the patentee:—“ The  
 “ machine being mounted as represented by figure 1, the digger  
 “ draws it near the ground which he intends to dig up, and then,  
 “ standing with his back towards the said ground, lifts the machine  
 “ up, and presents the edges of the spades within six inches of the  
 “ ground, to its surface as perpendicular as possible. In this  
 “ situation he treads with his right foot upon the middle piece C,  
 “ driving the spades into the earth; then he shakes the frame of  
 “ the helves with both hands, in order to separate the ground a



“ little from the spades ; this being done, he pulls the said frame  
“ with a little more elastic movement towards himself, which  
“ loosens the ground, and finally a third still more elastic and  
“ strong shake, given with his body bending forward, will  
“ throw the ground over, smoothen and levell it. After which,  
“ the digger goes one step backwards, and advancing the machine  
“ ten inches more inside the ground, continues his labour, till  
“ having finished the length of it, he turns the machine upon its  
“ wheels, such as to stand with his back towards the ground, and  
“ goes on the same way alongside of the spot or line he dug up  
“ first.”

[Printed, 5*d.*]

A.D. 1800, February 4.—N<sup>o</sup> 2373.

LUMBERT, RICHARD.—Improvements in drain ploughs and in the means of giving motion thereto. The plough has two straight coulter, the foremost serving to divide the soil, and the other carrying the mole share or cone by which the drain is formed. The diameter of the drain may be increased by affixing conical pieces of iron to the base of the cone, or by attaching to it a series of cones or balls, chained together, and gradually increasing in size. The cone may also be furnished with a moveable steel point, having a spiral worm upon it, so that as it passes through the earth it will be caused to rotate (which motion will facilitate its progress through the earth), or a rotary or boring motion may be imparted to it by suitable gearing. More than one drain may be formed by the same operation by connecting a cone or cones to the back coulter above the first-named cone or share.

Three modes of giving motion to the plough are described. In the first arrangement, a wooden frame is affixed to and projects in front of the beam, carrying a windlass barrel or roller, which is turned by the power of two or four men applied to a couple of winch handles, whereby a chain connected to an anchor or holdfast in advance of the plough is wound upon the barrel, and thus the implement is drawn along. In the second plan, two barrels are mounted in a carriage which travels upon four rollers, separate from the plough, and the labour of six or eight men, or more, is employed to turn the barrels and wind up the draught chain,—the carriage being held by an anchor and moveable struts or spurs during the winding operation. The third method consists simply in employing horses to draw the plough.

This invention and several subsequent ones of a similar character are introduced because the method of giving motion to the plough by winding up a chain or rope has been extensively adopted in steam ploughing machinery; the use of a screw to draw forward or impel agricultural implements has also been included in several plans for ploughing by steam power; broad wheels or rollers have likewise been extensively employed for supporting steam ploughs, &c., and preventing them from sinking into the soil. For further information on the two last-mentioned subjects, the reader is referred to the series of Abridgments entitled "Aids to Locomotion."

[Printed, 7*d*.]

A.D. 1808, February 4.—N<sup>o</sup> 3106.

DUMBELL, JOHN.—This invention, so far as it relates to the performance of agricultural operations, consists in the use of a peculiar kind of portable or travelling engine for drawing or impelling ploughs and other agricultural implements. The engine is actuated by steam or vapour, produced by permitting water or any other suitable liquid to drop upon metal, which is kept at the most intense degree of heat that can be imparted to it. The steam or vapour acts on a series of vanes or flyers (similar to the sails of a windmill or the flyers of a smoke-jack), and causes the same to rotate together with the shaft to which they are fixed; and the motion of the shaft is transmitted through suitable gearing to the running wheels of the carriage.

Printed, 1*s*. See Rolls Chapel Reports, 7th Report, p. 106.]

A.D. 1809, June 8.—N<sup>o</sup> 3242.

DOBITS, MARK.—"A new or improved plough for under-draining land." The plough is furnished with a straight upright coulter near the foremost end of the beam to divide the soil, and at a short distance behind there is a second upright coulter, which carries at its lower end a mole share to form the drain. The plough is drawn forward by a chain or rope connected to a capstan, which is turned by horses or men; the frame that carries the capstan being retained in its proper position by anchors and props or stays.

[Printed, 6*d*. See Repertory of Arts, vol. 15 (*second series*), p. 329; and Rolls Chapel Reports, 7th Report, p. 202.]



A.D. 1810, February 26.—N<sup>o</sup> 3309.

PRATT, MAJOR.—The object of this invention is to give motion to agricultural implements and vehicles by wind, steam, or other mechanical power, instead of employing horses or other animals.

1. Machine for ploughing, consisting of a carriage, mounted upon four wheels, and divided transversely into two parts, which are so connected as to be capable of being moved on a given distance alternately by the action of a horizontal arm carried by an upright shaft in the fore part of the carriage. This shaft is driven by wind, steam, or other power, and carries at the bottom a horizontal beam, to each end whereof is affixed a plough, so as to produce a circular furrow; each plough acting only during one half of the revolution of the shaft, and being raised from the ground during the other half by curved rails on the bottom of the carriage. Straight furrows may be produced by removing the ploughs from the beam and fixing an equal number of ploughs to the fore and hind parts of the carriage.

2. Machine furnished with another arrangement of apparatus for lifting the ploughs when ploughing several circular furrows at the same time. This machine is moved onward by means of endless chains, extended horizontally over chain wheels, driven by gearing from an upright shaft like that before mentioned;—the endless chains having arms jointed thereto, carrying transverse bars provided with spikes or holders, which successively take hold of the ground. This machine may also be made to plough in straight lines by applying similar chain wheels and chains to the hind end of the carriage and substituting ploughs for the transverse spiked bars. Instead of ploughs, harrows, rollers, hoes, drills, or other implements may be applied to this or any other machine described.

3. Mounting several drill or ridge ploughs in a carriage which runs on four wheels.

4. Ploughing by means of three four-wheeled carriages, which travel along the field parallel to each other, with two endless chains extended between them, and passing around a single horizontal chain wheel on the outer carriages, and around a double chain wheel, driven by mechanical power, on the centre carriage. Ridge ploughs being attached to the chains, two ridges will be ploughed at the same time between the centre carriage and each outer carriage.

5. Attaching harrows or other agricultural implements to the arms of a horizontal windmill.

6. Apparatus for communicating motion to the endless chains and transverse spiked bars or holders before-mentioned, in order to propel carriages or other vehicles.

7. Placing the carriages described under the 4th head in barges, where there are "cuts of water," in order to plough the land between them.

8. Employing a plough which appears like two ploughs fixed back to back (as in some kinds of turn-wrest ploughs), and is drawn alternately in opposite directions by a chain and wheel like those used in Baker's patent mangle.

[Printed, 1s. 5d. See Rolls Chapel Reports, 7th Report, p. 208.]

A.D. 1810, June 8.—N<sup>o</sup> 3343.

HICKFORD, GEORGE.—1. Applying two wheels to the front end of the beam of a drain plough instead of a single roller.

2. Mounting the frame of the capstan or machine for drawing the drain plough upon three wheels only.

3. Inclining the capstan, when necessary, by raising one end of the frame.

4. Applying moveable segments to the capstan to increase its diameter.

5. Employing cog-wheels to transmit the power of the horses or other animals to the capstan.

[Printed, 7d. See Rolls Chapel Reports, 7th Report, p. 210.]

A.D. 1812, December 30.—N<sup>o</sup> 3632.

CHAPMAN, WILLIAM, and CHAPMAN, EDWARD WALTON.—This invention relates to the traction of carriages on railways and other roads by means of chains or ropes connected to the railway or road, and acted upon by a steam or other engine contained in such carriages. Although the patentees do not state that it is applicable to the purpose of working ploughs, &c., yet it is here introduced because several schemes for giving motion to agricultural implements upon this plan have been brought before the public. The chain or rope, which is stretched along the railway or road, is fastened at each end, and rests at intervals in stationary forked pieces. It is passed around a grooved wheel or pulley at the foremost end of the carriage, which is caused to rotate by the



engine, and thus to draw the carriage,—each forked piece holding the chain firmly until the carriage approaches so near as to lift the chain from between the forks.

Instead of a long chain, fastened at each end to the railway or road, a short endless chain may be used. This endless chain is passed partly around the grooved wheel before mentioned, and partly around another grooved wheel, mounted upon a small carriage, which is connected to the steam carriage by a spar or spars, so as to precede the latter carriage at a suitable distance to keep the chain properly distended.

[Printed, 1s. 2d. See Repertory of Arts, vol. 24 (*second series*), p. 129; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 396.]

A.D. 1814, June 18.—N° 3817.

TINDALL, THOMAS.—The part of this invention which relates to the working of agricultural implements consists in connecting such implements to a portable or travelling steam-engine mounted on three or five wheels. The engine is to be of either the reciprocating or rotary kind, and may be assisted by a horizontal wind-mill, driven partly by the exhaust steam and partly by the action of the wind. The power of the engine is applied to cause four pushers or legs at the back of the carriage to come successively in contact with the ground and impel the carriage; and it is also proposed that the engine shall at the same time act upon the rim of the carriage wheels when ascending hills. Ploughs, harrows, drills, wheels with scythes affixed thereto, or other implements, are to be connected to the carriage.

For other inventions relating to the use of pushers or impelling legs, see the series of Abridgments entitled “Aids to Locomotion.”

[Printed, 1s. 2d. See Rolls Chapel Reports, 7th Report, p. 115.]

A.D. 1816, January 9.—N° 3973.

REYNOLDS, JOSEPH.—The object of this invention is by the use of steam, heated air, or vapour to give motion to carriages and agricultural implements. The steam-engine is represented with horizontal cylinders, similar to a locomotive engine. The patentee describes an improved mode of suspending the boiler and constructing the joints of the pipes which communicate therewith, so that the boiler may always retain a horizontal position and swing

without injury to such joints. The carriage is supported at the front by a single wheel, and at the back by two very broad wheels or rollers, which sustain the principal part of the weight of the carriage. The latter wheels are capable of rotating independently of each other; and to the inner side of each a toothed wheel is affixed. The power of the engine is communicated to these wheels by an arrangement of toothed gearing, which can be so adjusted as to cause one broad wheel to rotate in one direction whilst the other broad wheel is rotating in the opposite direction, and thus to turn the carriage in a very small space.

This steam carriage may be used for drawing rollers, ploughs, cultivators, twin-harrows, drilling machines, &c.; or the power of the engine may be applied to drive machinery employed for thrashing or winnowing grain or for any other purpose by disconnecting the engine from the running wheels and connecting it by the toothed gearing with the machinery to be driven.

[Printed, 1s. 1d. See Rolls Chapel Reports, 8th Report, p. 115.]

A.D. 1819, January 26.—N° 4338.

THOMAS, MATTHEW (*partly a communication*).—This invention, to quote the patentee's own words, consists in "a certain plough, communicated to me by a foreigner residing abroad, upon which I have invented an improvement, and also a propelling power, applicable to ploughs in general, and also to various other implements and machines." The improvements embrace the making of beams and coulter for ploughs of cast iron; using wheel or revolving coulters; and applying a couple of rollers in place of the ordinary sole plate, to lessen friction. The description of the "propelling power" is perfectly unintelligible; a small part of the plough beam is represented, with two pairs of toothed wheels or double toothed wheels mounted thereon, and gearing into each other; a short piece of rope is also shown; but no explanation is given of the action of the apparatus, nor of the motive agent by which the plough is drawn forward.

[Printed, 9d. See Rolls Chapel Reports, 7th Report, p. 121.]

A.D. 1819, May 18.—N° 4372.

COWPER, TEW.—Drain plough, to be put in motion by an improved capstan, turned by a horse, or to be drawn by horses in the same manner as an ordinary plough. The drain plough has a



circular cutter to divide the soil, and a straight coulter with a mole share or borer at the lower end to form the drain. It is furnished with two long upright regulating screws, which are connected with a roller at the foremost end of the beam, and with a pair of wheels near the hind end of the beam. By turning these screws the plough may be raised out of the working line at any period of its operations, or suited instantly to any irregularities on the surface of the ground.

[Printed, 6*l*. See Repertory of Arts, vol. 36 (*second series*), p. 74; London Journal (*Newton's*), vol. 1, p. 13; and Rolls Chapel Reports, 8th Report, p. 13.]

A.D. 1824, December 18.—N° 5056.

GORDON, DAVID.—Arrangement of mechanism for propelling a locomotive carriage over a railway or common road, or for propelling ploughs, harrows, or other agricultural implements. “ This action is performed by the operation of a number of rods “ or propellers; which rods or propellers are attached at one of “ their extremities to a like number of cranks, situated upon one “ common axis across the carriage, near to the hind part thereof; “ whilst their outermost extremities are formed as will be herein- “ after described, so as to be capable of seizing the ground in a “ sufficient degree to propel or drive the carriage or other machine “ aforesaid forwards, being at the same time connected by rods or “ cords with the extremities of certain levers, which are operated “ upon by an equal number of excentric shapes or wheels,” fixed upon one common axis. As the crank axis and excentric wheel axis are caused to revolve with equal velocity, by steam or other power, the rods or propellers will be forced or thrown out backwards, “ and by the form or shape of the excentric wheels the “ outermost extremities of the propellers will only remain in “ contact with the ground at the time when they are moving with “ the greatest velocity, or nearly so; at other times the extremities “ will by the action of the excentric wheels be taken up entirely “ off the ground.” The outer extremity of each propeller is furnished with an arched piece of metal or foot, the curved under surface whereof forms an arc of a circle having the same radius as the circle described by the cranks which move the propellers. The under surface of the foot is shod with “ pieces of cork, short hair, “ whalebone, or other suitable material, set on end like a stiff “ hard brush; the said substances to project a short distance

“ beyond the points or extremities of iron teeth. Thus, if the  
 “ flexible material should yield in any considerable degree, the  
 “ points of the iron teeth aforesaid would come in contact with  
 “ the ground, and would act as propellers to advance the carriage  
 “ forwards.” When the ground is covered with ice or hard snow,  
 the feet are to be provided with steel points, which may project  
 sufficiently to take hold of the ground and impel the carriage.

[Printed, 10d. See Repertory of Arts, vol. 1 (*third series*), p. 28; London Journal (*Newton's*), vol. 11, p. 76; Register of Arts and Sciences, vol. 2, pp. 33 and 321, also vol. 1 (*new series*), pp. 273 and 289; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 460.]

A.D. 1830, July 1.—N° 5950.

CLIVE, JOHN HENRY.—This invention relates to locomotive engines or machines for drawing ploughs, harrows, or other machines, and carriages.

1. Employing wheels (or shapes having in action the effect of wheels) of larger diameter than those heretofore used.

2. Applying the power of the engine or engines to such wheels at a greater distance from the centre or axis thereof than has hitherto been the practice.

3. In cases where the locomotive engine or machine is required to be steered along a curved course, placing a broad wheel at the middle of the breadth of the machine, so as to bear the principal part of the weight, and communicating the power of the engine thereto. The carriage of the engine is also provided with a pair of fore wheels, the axletree whereof can be turned around an upright perch bolt by the steersman, and with a pair of hind wheels, turning on an axletree connected to the carriage by springs; but these wheels bear only a small portion of the weight of the machine.

[Printed, 4d. See London Journal (*Newton's*), vol. 1 (*conjoined series*) p. 256; Register of Arts and Sciences, vol. 5 (*new series*), p. 259; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 522.]

A.D. 1832, May 15.—N° 6267.

HEATHCOAT, JOHN.—Machinery and apparatus worked by steam or other power for ploughing, rolling, harrowing, and draining land, and for effecting such other operations of husbandry as may be performed by traction;—such machinery and apparatus being particularly adapted for use on lands which



cannot be conveniently tilled in the ordinary way by the agency of horses or other animals.

1. Employing a carriage of large dimensions, fitted with a steam engine or other motive-power machine and suitable winding gear, and mounted on a series of wheels, which conduct an endless flexible floor, railroad, or way, within and upon which the carriage is caused to travel by the power of the engine. This endless flexible floor, railroad, or way affords a very broad and extended surface for the purpose of sustaining a carriage of great weight upon soft, swampy, boggy, or unstable land.

2. In some cases mounting the carriage on broad rollers or drums instead of using the wheels and flexible endless floor, railroad, or way. The carriage may then be employed as a heavy rolling machine (in order to consolidate the soil or to break down lumps or clods), as well as for the purpose of giving motion to ploughs and other implements in the manner hereafter explained under the 4th head.

3. Mounting the carriage upon wheels proper for travelling upon land or soil of a sufficiently firm and compact nature, in order to simplify the application of the machinery and apparatus to the culture of such soils.

4. Employing auxiliary carriages, placed on each side of the principal carriage, at a distance from it, and parallel thereto. By means of ropes, bands, or chains, issuing from and actuated by the machinery of the principal carriage, and passing around a wheel, pulley, or barrel on the auxiliary carriages, the ploughs or other implements are drawn to and fro between the principal and auxiliary carriages. As the principal carriage travels along the field, the auxiliary carriages are caused to move at a corresponding rate.

When required, the principal carriage may be moved to any place where the power of the engine may be advantageously used for working corn mills, thrashing machines, chaff-cutters, pumps, or other machinery.

[Printed, 2s. 3d. See London Journal (*Newton's*), vol. 8 (*conjoined series*), p. 329; and Rolls Chapel Reports, 7th Report, p. 144.]

A.D. 1832, December 20.—N° 6351.

SAXTON, JOSEPH.—In this Specification, as in that of No. 3632, no mention is made of the applicability of the invention to agricultural purposes; but some of the methods of drawing agricultural



implements, subsequently proposed, have apparently sprung from it; and for this reason a description of it is now inserted. The invention relates to the traction of carriages and of vessels used in inland navigation; and it consists in the application to this purpose of pulleys of different diameters (termed "differential pulleys,") or of a pulley and wheels of different diameters,—the object being, as stated by the patentee, to take advantage of the results which are obtained from such difference of diameter, by giving considerable velocity to carriages or vessels, whilst the rope by which the motion is produced is caused to act through a very small space in proportion to the distance travelled by the carriage or vessel.

The differential pulleys are two in number, their diameters being, say, as 6 to 7. They are placed side by side upon a horizontal axle, which turns in a forked frame at the front of the carriage. The larger pulley is permanently affixed to the axle; whilst the smaller pulley is capable of turning loosely thereon; but when the carriage is to be put in motion, the two pulleys are secured together by a sliding pin. An endless rope, supported at intervals by sheaves, passes around a rigger at each end of the length of road to be travelled,—suitable means being adopted to keep it distended. This rope also passes around the differential pulleys, its course being as follows, commencing with the smaller pulley:—After passing around this pulley, it is conducted to the rigger at one end of the road; thence it returns to the differential pulleys, and passes around the larger one; it then proceeds to the rigger at the opposite end of the road, and returns therefrom to the smaller pulley,—thus completing its course. If the two pulleys were at liberty, the motion of the rope would cause them to rotate in opposite directions; but they are securely connected together as above stated. Therefore the compound action of the rope (one part tending to turn the smaller pulley in one direction, while the other part tends to turn the larger one in the opposite direction) has the effect of causing the combined pulleys to turn upon a point situated in a perpendicular line let fall from the axle of the pulleys, and about midway between the two circles representing the peripheries of the pulleys; and this motion impels the axle of the pulleys forward (and with it the carriage to which it is attached) to a distance exceeding that travelled by the rope in the proportion of 13 to 1: that is to say, while the rope is moving a distance of 1 foot it impels the carriage 13 feet.



The patentee describes two modifications of the above arrangement, in which only one pulley is used, the front or back wheels of the carriage acting as the other pulley. In these instances the rope may be endless, as above described; or it may be a single rope, winding on to a drum at each end of the road.

Vessels are to be moved along canals or rivers by means of the differential pulleys and endless rope in a similar manner to carriages.

In all the above cases the rope may be put in motion by horses, by a steam-engine or water-wheel, or by manual labour.

[Printed, 9d. See Repertory of Arts, vol. 16 (*third series*), p. 74; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 92; and Engineers and Mechanics' Encyclopedia, vol. 2, p. 563.]

A.D. 1833, October 7.—N° 6481.

YOUNG, WILLIAM TANNER.—“A machine or apparatus for “equalizing draft, chiefly applicable to the towing of barges and “other floating bodies on water, and moving or drawing carriages “on land.”

[No Specification enrolled.]

A.D. 1836, June 13.—N° 7118.

VAUX, THOMAS.—This invention, the subject whereof is a revolving harrow, is introduced into this series of Abridgments on account of its similarity to some of the rotary steam cultivators lately brought under public notice. The teeth or tines are curved or bent, and are fixed around several naves or bosses, carried by two axes; which axes are mounted in a horizontal position in the framing, one before the other, and at such a distance apart that the teeth or tines upon one axis will work between the teeth or tines on the other axis; and therefore, the teeth in the act of revolving, will not only pulverize the earth, but at the same time clear each other of clods, couch grass, &c. The framing of the harrow is supported behind by two narrow wheels, and in front by a pair of broad wheels or rollers.

[Printed, 9d. See Repertory of Arts, vol. 8 (*new series*), p. 215; and London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 90.]

A.D. 1837, November 4.—N° 7458.

UPTON, JOHN.—Improved steam boiler and rotary engine, principally intended for giving motion to agricultural implements, but

also applicable to other purposes. The boiler and engine are fixed on a four-wheeled carriage, which is to travel over the land, drawing after it the ploughs, harrows, or other agricultural implements.

The hind wheels are bolted to two short cylinders, which turn freely on the hind axle of the carriage. On the inner end of each short cylinder there is a cog-wheel, which gears into a pinion on the axis of the rotary engine; and thus motion is given to the hind wheels. Either wheel, however, can be readily disconnected, in order to enable the carriage to turn in a small space.

[Printed, 9d. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 149; and *Mechanics' Magazine*, vol. 30, p. 49.]

A.D. 1839, June 17.—N<sup>o</sup> 8108.

CAMPBELL, ALEXANDER FRANCIS, and WHITE, CHARLES.—In this Specification the patentees describe a mode of combining a series of ploughs in a diagonal line to turn over all the land on one side. The ploughs are affixed to a frame which is carried by three wheels,—two of the wheels being on the fore carriage, and the third wheel (which rolls in the furrow of the last plough) supporting the hind carriage of the machine. It is stated that the object of combining so many ploughs on a three-wheel carriage is with a view to plough a considerable breadth of land at one time; and the machine may be drawn by power, “whether from a fixed or other engine or otherwise.”

[Printed, 5s. 2d. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 307; and *Inventors' Advocate*, vol. 2, p. 19.]

A.D. 1839, August 26.—N<sup>o</sup> 8207.

PINKUS, HENRY.—This invention consists principally in giving motion to agricultural implements and machinery by “pneumatic atmospheric auxiliary power” and “gaso-pneumatic power.” The first-named is generated by means of a partial vacuum and by the pressure of the atmosphere; the vacuum being induced by stationary first-movers, such as steam-engines, water-power machines, &c. The gaso-pneumatic power is produced by the explosion of mixtures of carburetted hydrogen or similar gas and atmospheric air in close chambers, so as to act against pistons and put them in motion.

The patentee proposes to lay down a system of pipes or mains in the fields to be cultivated, and to connect the same with a central



station, which contains either a steam-engine or other first-mover and apparatus for producing a vacuum in the pipes, or else a gasometer to supply the pipes with gas. The pipes are laid from two to three feet below the surface of the ground, but are provided at certain distances with vertical branches, to which the locomotive engines used for working the implements are temporarily connected. These engines are suitably constructed for being worked by means of a vacuum and atmospheric pressure, or by the explosion of gaseous mixtures. On the frame of the engine there is a revolving drum, carrying a flexible tube, the outer end whereof is successively fastened to various vertical branch pipes, and the inner end is attached to a chamber connected with the cylinders of the engine. The cylinders are thus put into communication with the pipes, which either serve to exhaust the cylinders or to supply them with gas, according to the power employed. When the engine moves along the field, the drum revolves, so as to wind up or unwind the flexible tube, as it approaches to or recedes from the branch pipe to which it is at the time connected.

The drum and flexible tube may be removed, and the engine furnished, in lieu thereof, with a large vessel or receiver, which is to be exhausted of air or charged with gas as often as may be necessary, being connected for that purpose by a short flexible pipe with one of the vertical branches.

Instead of working the engine by a partial vacuum and the pressure of the atmosphere, it may be actuated by compressed air, supplied by means of the long flexible tube and drum.

In order to give the wheels of the engine a firm hold of the ground, studs of a tapering form, four inches high and of the same width as the wheel, are fixed on and around the tire. The forward motion of the engine may be assisted in deep ploughing, drain ploughing, or subsoil ploughing in stiff soils, by the employment of a rope or chain, fastened at a given point in the field of operation, and passing around a pulley fixed on a wheel which is caused to rotate by the power of the engine. For marshy or boggy lands, in order to prevent the engine from sinking, a metal rim (say twelve inches wide), may be bolted on the periphery of each wheel; and an endless apron of coarse-mesh wire-gauze may be stretched around the fore and hind wheels on each side of the engine: when the machine is in motion the apron will move round with the wheels, which will run upon it.

The engines, instead of travelling over the land and drawing the implements after them, may be used for giving motion to endless



ropes or chains to which the implements are attached;—such method of working being particularly adapted to till hilly lands. “Where a roping system may be so applied on the steep inclinations of hilly lands, a well-known system of pulleys, called the differential pulley, may be combined with the said impelling engine and mains.” The engines may also be employed for putting thrashing machines, corn mills, &c., into operation.

The agricultural implements may be of the ordinary construction, and connected to the engine in a suitable manner, or they may be of certain modified forms. For ploughing, the locomotive engine is furnished at each end with a set of ploughs, fixed in a diagonal direction to a lever or beam, by which they can be lowered into or raised out of action; one set being in action when the engine is moving in one direction, and the other set when it is travelling in the opposite direction. To perform the operation of harrowing, a circular harrow, or large disc with tines projecting from one side thereof, is fixed in a horizontal position to the lower end of an upright shaft, which is caused to revolve as the engine progresses. If the impelling engine is to be applied to the purpose of digging or excavating, it is furnished with a set of spades, to which the requisite movements are given by excentrics. When it is desired to dig up, pulverise, and riddle or sift the upper strata or substrata of fields, there is attached to the engine, in connection with the arrangement for digging, an apron or endless band of wire-gauze or other flexible material, extended lengthwise of the engine, and just clear of the ground, between two horizontal rollers, which receive motion from the axles of the running wheels. The spades dig up the earth, and throw it up an inclined plane or grating on to the endless apron, which carries it beneath a spiked roller, whereby it is pulverised; and then the pulverised earth is discharged from the apron in a loose state. In order to collect stones on stony lands, if the meshes of the apron be sufficiently large, the spiked roller may be made to force the earth through the meshes, and the stones will be carried to the back roller and discharged from the apron into a box, or else removed and thrown in heaps. For mowing or reaping, the engine is to be provided with an endless apron, and with a vertical shaft carrying two or more scythes, so that, as the shaft revolves, the scythes will cut the grass or grain, which will fall upon the apron, and be discharged at the back of the engine, or it may be gathered from the apron by hand.



A.D. 1839, December 24.—N° 8329.

MACRAE, ALEXANDER.—Machinery for cultivating land by steam-power, specially applicable to British Guiana, where the cultivated land is flat or nearly so, and the fields are separated by navigable canals, which run parallel to each other, at a distance of from 240 feet to 360 feet apart. In carrying out this invention, two punts or shallow vessels, floating in two adjacent canals, are employed; one punt carrying a steam-engine which gives motion to a winding drum, and the other simply fitted with a pulley. The ploughs or other implements are connected to a four-wheel carriage. A chain or rope, fastened to the carriage, is passed twice or oftener around the winding drum; it is thence led across the field (over several supporting rollers on the under part of the carriage) to the pulley in the second punt, and after passing around this pulley, it is carried back to the carriage, and secured thereto. The engine is caused to turn the drum in opposite directions alternately, and thus to draw the carriage and implements to and fro across the field; and after each traverse of the carriage, the punts are moved along the canals a suitable distance to allow the implements to act upon a fresh portion of the field. In the drawing the carriage is furnished with two sets of ploughs to work in opposite directions; one set being raised and the other set lowered into action at the end of each traverse. Harrows or other implements may be attached to the carriage, which, however, is only suitable for level land. Where the land undulates, the power of the engine is applied direct, by means of the chain or rope, to all sorts of agricultural implements usually worked by horses or other animals.

[Printed, &c. See Repertory of Arts, vol. 14 (*new series*), p. 212; London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 434; and Inventors' Advocate, vol. 3, p. 3.]

A.D. 1840, January 1.—N° 8331.

NICOLAS, JOHN LEO.—“Certain improvements in the method of constructing and propelling carriages on railways or common roads and through fields for agricultural purposes.”

1. Applying pendent levers or legs to a locomotive engine or carriage, in order to propel the same in certain situations where the usual driving wheels would be found partly or wholly ineffectual, such as up very steep acclivities, over newly-made roads or



ploughed lands, and through fields whose surface is uneven and is always slippery in wet weather. Each leg has a foot or shoe at the lower end thereof, and is suspended from the forward end of a lever, which is weighted at the hind end, and turns freely on a horizontal axis. The legs are successively pressed downward and backward against the ground by radial arms on a horizontal revolving shaft; and as each arm ceases to act on its leg, that leg is raised by the weight just mentioned and carried forward by the carriage until it is again depressed.

2. "The second part of my improvements are intended to apply only in marshy and boggy situations, where wheels would sink into the soil and could not be propelled. This improvement, which I intend to use in conjunction with the before-described arrangements for propelling, is a kind of moveable and portable railway or road, which is laid down, travelled over, taken up, and carried by the machine itself. It consists of a number of boards with raised sides, and having their upper surface roughened for the purpose of giving the feet or shoes of the pendant arms, before described, a good hold, in order that the carriage may be propelled. These boards, after being used for supporting the pendant levers, are raised from the ground by a peculiarly shaped compound lever, and are carried forwards to the front of the machine by means of a travelling endless cloth, furnished with hooks and passed over rollers, one of which is situated at the front part and the other at the back part of the machine. The boards brought forward in this manner are to be lowered in front of the carriage by means of a compound lever, similar to the one employed for raising them from the ground. At the time that the lower ends of the pendant wheels are acting against any particular board, the running wheels of the carriage are passing over that board, which is thereby prevented from slipping away."

3. Rotary engine, to be worked by steam, air, gas, or other fluid."

[Printed, 1s. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 76; and *Inventors' Advocate*, vol. 3, p. 20.]

A.D. 1840, April 16.—N° 8480.

COOPER, ROBERT.—Plough for making a deep trench or cutting for drains. It is furnished with two beams, fixed parallel to each other at a distance apart somewhat exceeding the width of the



trench to be cut. These beams carry two revolving coulters, for dividing the upper surface of the soil and anything growing thereon, and thus clearing the way for two straight coulters, which shape the sides of the trench. A horizontal sledge with a cutting edge or share forms the sole-plate of the plough,—the share projecting between the fixed coulters, and making the cut that forms the bottom of the trench. The soil, as it is severed by the fixed coulters and share, rises in one undivided thickness up an inclined plane, between two land or side plates, and is deposited on the surface of the earth at the right-hand side of the trench. The plough is carried by two hind wheels in such manner that the depth of cut can be regulated at pleasure. The fore ends of the beams are supported by a carriage, mounted on a pair of wheels, and provided with apparatus for raising and lowering the beams. To the fore axle is attached a draught chain, to which the drag chain is to be fastened;—"such drag chain being in connexion "with a suitable capstan or windlass, as is well understood and "often practised when working mole ploughs."

[Printed, 1s. 4d. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 418; and *Inventors' Advocate*, vol. 3, p. 260.]

A.D. 1840, May 28.—N° 8517.

CAMPBELL, ALEXANDER FRANCIS, and WHITE, CHARLES.—The last part of this invention relates to ploughs to be worked by steam-power, and consists in so suspending the plough frame, in which several ploughs are fixed in a diagonal line (as described at No. 8108), that it can be readily moved laterally as well as up and down.

[Printed, 4s. See London Journal (*Newton's*), vol. 18 (*conjoined series*) p. 308; and *Inventors' Advocate*, vol. 4, p. 66.]

A.D. 1840, September 24.—N° 8644.

PINKUS, HENRY.—Part of this invention consists in working agricultural implements by electricity. The arrangements adopted bear a close resemblance to those described at No. 8207, for applying "pneumatic atmospheric auxiliary power" and "gasopneumatic power" to the same purpose. Pipes or mains are laid down in the various fields, below the surface, and connected with a central building or with several wells or tanks, provided with electric batteries. Numerous pairs of insulated wires extend from

the electric batteries through the pipes or mains; the several pairs respectively terminating in the vertical branch pipes with which the mains are furnished. The locomotive carriage employed for giving motion to the implements is fitted, in this instance, with an electro-magnetic engine; and upon its drum, instead of the flexible tube, two insulated wires are wound. These wires are connected at one end with the engine, and at the other with the pair of wires in one of the vertical branch pipes; and by this means electric currents are transmitted from the batteries to the engine, in order to put it in motion.

The wheels of the locomotive carriage are made, as in the former Specification, with studs, to give them a firm hold of the ground; and the carriage is to be furnished with ploughs, arranged as before described, or with any other implements referred to in the previous Specification.

[Printed, 6s. 8d. See *Mechanics' Magazine*, vol. 34, p. 299; *Inventors' Advocate*, vol. 4, p. 213; and *Engineers and Architects' Journal*, vol. 4, p. 174.]

A.D. 1841, September 17.—N<sup>o</sup> 9085.

STOLLMEYER, CONRAD FREDERICK (*a communication*).—Obtaining power from the wind and waves by means of sails, windmills, and floats or buoys, and applying the power so obtained to propelling vessels and driving machinery. The patentee describes an arrangement of apparatus for the transmission to a given distance of the power thus obtained. From the balance-beam of a machine with which the motive-power is to be connected two driving-ropes are carried to a double-necked pulley, turning on a pivot fixed in the ground, and the ropes are coiled several times around the first neck of the pulley to prevent their slipping. Around the second neck of the pulley are coiled two other ropes, fastened at their extremities to two sets of wires or chains, extended on the ground or on rollers at suitable distances; and these wires or chains are connected at their distant ends by two ropes or chains to a balance-beam, turning horizontally on a pivot fixed in the ground. Upon the same pivot there is a second balance-beam, connected by a rod with the first beam, and by a bar with a wheel put in motion by power obtained as above mentioned or by other means. A carriage for supporting the ropes that run from the double-necked pulley to the machine to be put in motion is also described.



It has been proposed to employ the above-described arrangement of apparatus for the purpose of giving motion to agricultural implements.

[Printed, 2s. See Inventors' Advocate, vol. 5, p. 330.]

A.D. 1842, July 6.—N<sup>o</sup> 9402.

HALL, JOSEPH.—In this Specification a delving and crushing machine is described, which, although it is to be worked by horses, is here introduced on account of its resemblance to some of the steam cultivators. The framework of the machine travels on three wheels, and carries two "parallel motion and tilting frames;" two axles extend horizontally across the machine, and revolve in bearings in these frames; and upon the axles are fixed two sets of wheels (viz., three on the foremost axle, and two on the hindmost axle), in such manner that the wheels of one set work in the spaces between those of the other set. Each wheel is armed with a number of "delvers and crushers," secured in angular positions across its periphery by swing joints, which allow a little play endwise as well as forwards and backwards, but do not permit them to turn over. By means of the parallel motion and tilting frames, the parallelism of each set of delvers and crushers to the plane of motion, as well as of the two sets of delvers and crushers to each other, is preserved under all circumstances. As the machine is drawn onward, the delvers and crushers penetrate and break up the soil. Machines may be constructed on this plan with more than two sets of delving and crushing wheels, or with only one set.

[Printed, 10d. See Record of Patent Inventions, vol. 1, p. 446.]

A.D. 1844, April 2.—N<sup>o</sup> 10,135.

STACE, WILLIAM, and VALLANCE, PHILIP.—"Application of wind-power, by means of portable windmills or machines, to drawing or working ploughs, and some other agricultural implements and carriages used in agriculture, such as harrows, rollers, scarifiers, clod crushers, drills, horse hoes, drain ploughs, mole ploughs, thrashing machines, winnowing machines, chaff cutters, and other implements that can be worked by power given off from a rotatory motion." For ploughing, harrowing, or other field operations, the implements are attached to an endless rope, which in its course passes around

four shifting pulleys, and is put in motion by two portable windmills, placed at opposite corners of the field. The following is the course of the rope:—From the first windmill it passes to a pulley on the same side of the field, thence across the field to a pulley on the opposite side, and onward to the second windmill; from this machine it proceeds to a second pulley on the same side, then passes across to the second pulley on the opposite side of the field, from which it returns to the first windmill.

[Printed, 2s. 1d.]

A.D. 1845, March 27.—N<sup>o</sup> 10,578.

TEISSIER, JOHN BAPTISTE SIMION, and TRIAT, ANTOINE HYPPOLYTE.—1. Propelling vessels by vibrating paddles at the stern.

2. Impelling locomotive engines and steam carriages by means of legs or "paws," each suspended from a separate crank upon two crank axles (one behind and the other in front of the vehicle), so that as the axles are caused to rotate by the power of the engine, the legs will successively act against the ground, and push forward the locomotive engine or steam carriage.

3. Employing a similar arrangement of legs or paws to propel agricultural implements. A machine for ploughing upon this plan is represented. It consists of a three-wheel carriage, having at the back (or at the front, if preferred) a crank axle, with the legs connected thereto; and behind the legs there is a set of eight ploughs, connected to the carriage in such manner as to work in a diagonal line. The crank axle may be caused to rotate by any suitable power in order to give motion to the legs.

[Printed, 1s.]

A.D. 1846, February 11.—N<sup>o</sup> 11,077.

CLARKE, THOMAS; FREEMAN, MARK; and VARLEY, JOHN.—Part of this invention relates to the application of the motive-power obtainable from atmospheric pressure to work machinery for tilling land. The exhausting apparatus is to be placed in the centre of the estate or farm, and may be actuated by a steam-engine, watermill, or windmill. This apparatus is connected with a main line of traction tube (similar to that employed on atmospheric railways), laid down on a road passing through the centre of the estate. Branching off from the main tube or pipe,



and at right angles to it, are several smaller pipes, placed about a quarter of a mile apart, which may communicate power to as many locomotive engines, suitably constructed for being put in motion by atmospheric pressure. Each set of ploughs or other agricultural implements is worked by two locomotive engines, placed on opposite sides of the plot of ground to be tilled, and communicating with the exhausted branch pipes at the sides of such plot. The ploughs (which are fixed in a diagonal line across the plough-frame) are drawn over the land in opposite directions alternately by means of two ropes or chains, fastened to opposite ends of the plough-frame, and connected to a drum on each locomotive engine; one rope being unwound as the other rope is wound upon its drum.

[Printed, 7s. 6d. See *Mechanics' Magazine*, vol. 45, pp. 217 and 252; and *Engineers and Architects' Journal*, vol. 10, p. 91.]

A.D. 1846, June 29.—N° 11,273.

ANDERSON, Sir JAMES CALEB.—A mode of employing steam as a motive-power to draw ploughs constitutes a part of this invention. The ploughs are attached to a steam carriage, fitted with a drum, around which a rope is passed in such manner that as the drum winds up the rope towards one end it unwinds the other portion from its surface. To each end of the rope is fastened an instrument termed a "plough anchor." On commencing the operation of ploughing, one of the anchors is carried forward a considerable distance in advance of the steam carriage, and caused to take a firm hold of the ground; then the engine, by means of the rope, warps the carriage and ploughs towards the anchor; and in proportion as the other end of the rope, to which the second anchor is attached, is unwound from the drum, that anchor is drawn forward by men or horses. When the carriage has arrived at the first anchor, the anchor is raised out of the ground, and the action of the engine being reversed, the second anchor takes hold of the ground, and the carriage is warped towards it, whilst the first anchor is being carried forward; and thus the operation can be repeated as often as may be necessary.

[Printed, 1s. 4d.]

A.D. 1846, July 10.—N° 11,286.

BEART, ROBERT.—This invention relates to an arrangement of machinery for scarifying and pulverizing land, which is stated to

be drawn by horses, but it is introduced into this series for the reason assigned at No. 9402. The machine is furnished with a row of ordinary scarifying tines; and behind these tines there is a horizontal shaft, carrying a series of pulverizing and cleansing discs or wheels, having their peripheries serrated or formed with angular teeth, and working between the stems of the tines. "The pulverizing and cleansing wheels are so arranged that they by their teeth may come into action on the land as the surface thereof is raised and rises up between the tines, and in such manner that the teeth of the pulverizing wheels will penetrate the raised surface of the land, and cause it to be broken, and will also assist in preventing the roots and other matters rising up the stems of the scarifying tines."

[Printed, 1s. 7d.]

A.D. 1846, July 15.—N<sup>o</sup> 11,297.

BONSER, THOMAS, and PETTITT, EDWIN WATKIN WILLIAM WYNN.—"Our improvements in machinery for tilling land consist in employing for the purpose a tiller, formed of a cylindrical shaft or drum, having a number of radial cutters, or prongs or tines, either straight or curved, attached thereto at right angles, and arranged round it spiral-wise, so as to present the appearance of a screw; and in combination therewith, the mechanical auxiliaries necessary for causing the same to penetrate the soil." The framework of the machine is carried by a roller or a pair of wheels; and it is put in motion by a horse or other animal, or by "any other suitable motive agent." The tiller is placed across the lower part of the back of the machine, with its axis at right angles to the direction in which the machine is travelling; and it is caused to rotate by toothed gearing from the axis of the roller or running wheels. It is stated that "the cutters, or prongs or tines, not only penetrate, divide, break up, and crush the soil most effectually, but serve to cut and eradicate any weeds or roots with which it may happen to be encumbered."

[Printed, 6d. See Patent Journal, vol. 2, p. 587; and Mechanics' Magazine, vol. 46, p. 101.]

A.D. 1846, July 23.—N<sup>o</sup> 11,303.

CLAUSSEN, PETER.—This invention includes certain arrangements of apparatus for effecting the propulsion of vessels, agricultural implements, and vehicles by means of a long rope or chain,



secured at each end, and passed around pulleys, which are carried by the vessel, implement, or carriage, and made to rotate by a steam-engine or other prime mover.

Several arrangements are described. In each case two double-grooved pulleys are employed, affixed to two friction pulleys, which are so placed that their peripheries will be in contact with each other, or with the periphery of an intermediate friction pulley; and thus on motion being given to one of these pulleys, it will cause the other pulley or pulleys to rotate. The rope is passed around the grooved pulleys in such manner as to embrace a large portion of their peripheries; and when the pulleys are rotating they wind up the rope on one side and deliver it on the other,—thus drawing the vessel, implement, or carriage forward.

[Printed, 2s. 7d. See Patent Journal, vol. 2, p. 638; and Engineers and Architects' Journal, vol. 10, p. 88.]

A.D. 1846, July 23.—N<sup>o</sup> 11,304.

OSBORN, JOHN TULLOH.—Machinery for tilling and draining land, to be actuated by the power of steam, water, or air, or by animal power.

1. Two locomotive engines are caused to traverse the land on temporary rails, laid in parallel lines, at right angles to the direction in which the furrows are to run,—the distance between the two lines of rails being from one hundred to two hundred yards. Each engine carries two drums on the side nearest to the other engine; and to these drums are attached chains or ropes, by which two four-wheel carriages, fitted with ploughs or other implements, are simultaneously drawn across the field in opposite directions,—each carriage pulling after it the rope or chain by which it is to be drawn back again. Thus while one drum on each engine is at work winding up its rope, and so putting the ploughs or other implements in motion, the other drum is delivering out its rope in readiness for the return operation. After each traverse of the ploughs or other implements, the engines are moved forward by means of a chain or rope, one end whereof is attached to an anchor laid out ahead, and the other end to a drum connected with the crank shaft of the engine.

2. Where the fields are bounded on two sides by canals or ditches with a sufficient depth of water, the engines are placed in boats or punts; or if the fields should happen to be too wide to admit of this being done, then only one engine is placed in a punt

or boat, and the other travels on rails laid at a suitable distance from the canal or ditch.

3. Where land happens to be so much intersected by open and deep drains or ditches (as in British Guiana) that it cannot be conveniently cultivated by ploughs of the ordinary length, it is proposed to use, in combination with the engines, a long two-way plough, which can be drawn across such drains without dipping or materially deviating from the horizontal line. It is provided with two coulter and with wheels at each end of the beam; and beneath the middle of the beam there is a double-ended share, together with a moveable mould-board, which turns on a vertical axis so as to act in either direction.

4. Another form of implement to be used, in combination with the engines, as a grubber, scarifier, or subsoil plough. It has a two-way action, and is furnished with ten cutters or shares,—five to act in each direction.

[Printed, 1s. 2d. See *Mechanics' Magazine*, vol. 46, p. 97.]

A.D. 1846, August 29.—N<sup>o</sup> 11,357.

BOYDELL, JAMES.—The apparatus which forms the subject of these Letters Patent has been applied to the wheels of vehicles used in the cultivation of land by steam power, in order to enable them to traverse the fields with facility. The invention is stated by the patentee to consist in “a mode of applying moveable  
“ detached parts of a railway to the wheels of carriages, whereby  
“ each part is successively placed by its wheel in the road or land  
“ over which the carriage is to pass; each piece of the railway,  
“ when down, allowing its wheel to roll over it; and the wheel  
“ lifts the pieces of the railway successively, and holds each piece  
“ in such position as to deposit it correctly when that part of the  
“ wheel which carries a part of the railway again comes near the  
“ earth: by which means a railway will continuously be formed  
“ and broken up as the carriage is drawn along on a road or over  
“ land, by which the power required to draw a given load will be  
“ reduced.” Two short arms project from the middle of each detached part or rail (forming a right angle therewith) and carry two pins, which work in two slots of a horse-shoe shape, formed in pieces of iron affixed to the felloe of the wheel; or there may be only one slot, receiving a single pin, which connects the two short arms together. This mode of attaching the rails admits of



the above-described movements taking place;—each rail being steadied in its different positions by three cogs, which project from the periphery of the wheel and enter notches made at the middle of the rail and near each end thereof.

[Printed, 6*d*. See Patent Journal, vol. 2, p. 698.]

A.D. 1846, November 21.—N<sup>o</sup> 11,460.

PIDDING, WILLIAM.—The second part of this invention consists in certain methods of applying “portable railways” to carriages. It is here inserted because the patentee, in the Specification of subsequent Letters Patent (No. 14,036, March 24, 1852), describes certain improvements thereon, and states that the same may be applied to agricultural purposes. Under each side of the carriage is fixed a long horizontal frame, the upper and under sides whereof are parallel, and the ends semicircular. Around this frame a series of rollers moves; the axes of the rollers being connected by links, so as to form an endless chain, which encircles the frame. Each link carries a small wheel, which stands at right angles thereto. These wheels keep the rollers at some distance from the ground; and the rollers serve to support the frame and consequently the carriage. Horses are attached to the frame, which, as it is drawn forward, rolls over the lower rollers, while the lower wheels remain stationary upon the ground until by the movement of the endless chain, produced by the advance of the frame, the hindmost wheel is lifted from the earth, and another wheel is brought down to the earth at the front end of the frame.

A modification of the above arrangement, to adapt it to railway carriages, is described, in which the small wheels are dispensed with, and the rollers come in contact with the rails;—guide wheels or guide plates being employed to retain the carriage on the rails. In some cases it is proposed to employ, in combination with this modification, an endless band of steel, wire-gauze, felt, leather, or other suitable material, passing between the lower rollers and the rails, over the upper rollers, and partly round a roller at each end of the frame.

There is another modification, consisting in the employment of endless bands of plates, passing under the wheels of carriages, to serve as a roadway, and kept in motion by the rotation of drums or rollers driven by the wheels of the carriage. The axle of the carriage wheel supports a triangular frame, having its vertex downward;

and at the two upper corners of the frame there are two "square rollers," carrying an endless band, composed of metal tram plates, hinged together, and passing under the wheel,—the tram plates being supported above the ground by a "shoe" at each hinge joint, fitted with springs at the sides to permit the carriage to move laterally when required. The rollers are caused to rotate by gearing from the carriage wheels, so as to lay down plates in advance of the wheel and take up those over which it has passed.

[Printed, 11*d*. See Patent Journal, vol. 3, p. 8.]

A.D. 1847, January 21.—N<sup>o</sup> 11,538.

BEADON, GEORGE, and SMITH, ANDREW.—Mechanism for warping or hauling vessels along canals or rivers and carriages on railways or tramways by means of a rope or chain secured at each end, and passed once around sliding arms or "whelps" on the side of a wheel or around the periphery of a wheel; so that when the wheel is caused to rotate by a steam engine the vessel or carriage will be drawn forward. Various arrangements of apparatus for nipping or binding the rope or chain to the wheel by temporary pressure are described.

This invention is referred to on account of its similarity to some of the plans for giving motion to agricultural implements by steam power.

[Printed, 2*s*. 8*d*. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 157; Patent Journal, vol. 3, p. 238; and Engineers and Architects' Journal, vol. 10, p. 291.]

A.D. 1847, February 16.—N<sup>o</sup> 11,581.

HOLLAND, PHILIP HENRY (*partly a communication*).—Applying liquid manure and water through hose or other pipes to land by means of a moveable steam engine and pumps, either placed in a boat or barge floating upon a river or canal, or else mounted upon wheels suitable for travelling upon a railway or for running over the surface of the land. Also distributing liquid manure through moulded earthen pipes formed with screw-joints.

[Printed, 3*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 350; and London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 125.]

• A.D. 1847, July 3.—N<sup>o</sup> 11,779.

HUDDART, GEORGE AUGUSTUS.—Part of this invention relates to rotary harrows or clod crushers. A rectangular frame carries a



series of transverse shafts, mounted horizontally in the side bars, so as to turn freely therein. These shafts are formed by twisting square bars of iron into helical figures; and spikes or tines are inserted, at equal distances asunder, in two opposite faces of each shaft. The harrow, thus made, is intended to be drawn over the ground by "horses or other power," when the joints of the spikes or tines taking into the earth will cause the helical shafts to revolve, and the successive insertion of the tines will break up the clods and loosen the soil.

A modification of this harrow is described, differing from it only in the substitution of flat knives or cutters for the spikes or tines.

In another modification, zigzag or crank-formed bars are substituted for the helical shafts. Upon the angular parts of these zigzag bars, which are there made cylindrical, wheels with radial spikes are mounted, so as to turn freely in oblique positions; and thus when the implement is drawn forward, the spikes of each wheel will break the clods or open the soil in a direction obliquely to the course of the harrow.

[Printed. 1s. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 94.]

A.D. 1847, July 29.—N<sup>o</sup> 11,818.

PAUL, JOSEPH.—1. Revolving apparatus for cutting drains. A large wheel or drum, having a row of curved tines or teeth around its periphery, is fixed on a horizontal axle, which is furnished with a rigger or pulley to receive an endless chain from the "horse-power" whereby it is put in motion. The axle turns in bearings carried by two moveable legs, jointed to the front part of the frame of the machine, and capable of being raised or lowered according to the depth at which the cutter wheel is to act. The horse-power is a separate frame, carrying a vertical spindle, which has cross bars at the top for the attachment of horses, and on the lower part a small windlass and a rigger or pulley. To the front of the frame is fastened one end of a chain, which is passed through a pulley, connected to an anchor fixed in advance of the apparatus, and is then carried back and attached to the windlass. Hence when the vertical spindle is made to revolve by the horses, the windlass will wind up the chain, and so cause the horse-power to advance towards the anchor; and as the rigger is connected by the endless chain above mentioned with the rigger on the axle of the cutter-wheel, the latter will be drawn onward at the same time

that it is caused to rotate and cut the drain. The patentee remarks, "Although I have here shown and described the method of propelling and working the drain-cutter by horse power, I by no means confine myself to that mode, as power may be otherwise employed for that purpose."

2. Mode of filling the drains after the pipes have been laid therein.

3. Apparatus for raising the subsoil to the surface for agricultural purposes. A horizontal axle, supported by two moveable legs (like the axle of the drain-cutter), carries several naves or bosses, having curved tines or teeth affixed thereto; and at the middle of the axle there is a rigger, around which a chain from the horse-power passes, so as to cause the axle to revolve and at the same time to advance, in the same manner as the drain-cutter. "It is desirable to call attention to the direction in which the teeth travel, because in some respects this machinery is similar to revolving harrows or cultivators which have before been proposed. In this machine the teeth so act as to make their cut upwards, bringing up the subsoil in front of the axle; whereas in former machines the cut was downwards, moving the land backwards." For cutting up deep subsoils or forming drains, it is proposed to attach the tines or teeth to each side of the rigger, instead of the naves or bosses on the axle.

[Printed, 1s. 1d. See Repertory of Arts, vol. 12 (*enlarged series*), p. 365.]

A.D. 1847, September 30.—N<sup>o</sup> 11,879.

NICHOLLS, ROBERT HAWKINS.—The title of these Letters Patent is "Improvements in machinery for distributing corn and other grain on land, and also for improvements in giving motion to agricultural and other machinery." The patentee, however, only describes a hand-dibbler in his Specification, and by a Disclaimer, filed in the Great Seal Patent Office, March 30, 1848, he strikes out the words "and also for improvements in giving motion to agricultural and other machinery" from the title of his Letters Patent.

[Printed, 11d. See Repertory of Arts, vol. 12 (*enlarged series*), p. 74; and London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 445.]

A.D. 1847, October 14.—N<sup>o</sup> 11,907.

LILLIE, Sir JOHN SCOTT.—This invention relates principally to machines for ploughing, harrowing, mowing, &c.; but parts



thereof are applicable to waggons, carts, and common road carriages, to facilitate the impulsion of the same. The machine for tilling land consists of a large frame or carriage to which the ploughs, harrows, or other implements are to be attached. It has two sets of wheels, placed at right angles to each other; one set supporting the carriage while the implements are in action, and the other set, which can be lowered or raised, sustaining the carriage when it is shifted sidewise, in order to bring the implements into operation upon a fresh portion of the land. On each side of the carriage there are two "square stave or skeleton drums," over which passes an endless railway, formed of wooden planks or wrought iron plates hinged together, so as to turn freely over the drums and circulate around the bearing wheels of the machine which travel thereon. A double mould or ridge plough is fixed to the carriage, so as to precede the wheels and clear the furrow or path between the ridges for their reception. Motion is communicated from one of the bearing wheels, by toothed gearing, to an axle extending horizontally across the carriage. "On this axle [says the patentee] I fix radial or curved pins, similar to harrow tines, hoes, or other suitably shaped points for breaking up the land, and coulters or cutting irons to the frame to precede these revolving instruments, and thus by scarifying or cutting the land into narrow longitudinal slips, afford greater facilities for the more effectual breaking of the soil by these revolving implements." It is also intended to employ the revolving apparatus for making excavations for drainage purposes.

In some cases the patentee proposes to fix a high-pressure steam-engine on the carriage frame, for the purpose of impelling the machine by turning a "whelp wheel," and thus causing it to draw on a rope, which is passed around it and kept distended by a grapnel on each side of the field. Instead of transverse wheels being employed for moving the machine sidewise, the carriage may be hauled on a light platform, placed on rails at right angles to the bearing wheels, and moved sidewise by a contrivance similar to the "crabs" used by builders. "In order to render frequent operations of this kind the less necessary, shafts or arms may be extended at each side of these carriages, to which a variety of agricultural implements may be attached; and by which means three ridges may be acted upon by the carriage being moved backwards and forwards in the same tracks as frequently as may be necessary for this purpose."

When the weight of the engine may be too great for the nature or state of the land, the carriage is to be drawn across the field by a steam-engine at each side, alternately winding up a rope or chain attached to the carriage; such engines moving on temporary rails along the headlands. Or only one steam-engine may be used, with an endless rope passing around the engine drum or whelp wheel at one side of the field, and around a pulley, carried by a platform mounted on wheels at the other side. And in some cases the carriage may be propelled by the power of horses or other animals.

"The moveable rails and hauling apparatus, already described, may be made applicable to carts or waggons for levelling land by the removal of the soil from the higher to the lower grounds, to water carts for the purposes of irrigation, and to ordinary carts or waggons for the removal of manure and such other loads as may be required for agricultural purposes; and when such carts are propelled by animal power, they may be provided with these endless rails."

A mowing machine is represented, consisting of a carriage furnished with two sets of wheels like that before described, but without the endless railway;—in this instance, however, the machine travels on the transverse wheels in the act of mowing; and the other wheels are merely used to shift it previous to commencing a fresh cut. The scythe-blades or cutters are attached to endless bands or chains, which pass around two broad pulleys on one side of the carriage. A steam-engine gives motion to these pulleys, at the same time that it causes a whelp wheel to wind on a stretched rope, in order to draw the carriage sideways across the field; so that as the machine advances, the scythes, travelling at right angles to such onward motion, will cut down a portion of the crop equal in breadth to the length of the carriage.

[Printed, 1s. 2½d. See Repertory of Arts, vol. 11 (*enlarged series*), p. 321; and Patent Journal, vol. 4, p. 553.]

A.D. 1847, November 25.—N° 11,977.

BARRAT, PIERRE PHILIPPE CÉLESTIN.—The subject of this invention is a machine, actuated by steam, for tilling and working land,—the principal feature of novelty being "the arrangement of one or two rows of teeth, to which on the one hand a rotary alternative movement is given, and on the other hand a to-and-



“fro movement, in such manner as to imitate as much as possible the work of the hand with a mattock, whereby the earth is returned to the ground after it is raised.” The machine consists of a steam carriage, travelling on four broad wheels, and fitted at the hind end with a horizontal frame, containing two rows of mattocks or cutting instruments. The head of each mattock is forked or made with two curved teeth; and it is fixed to a straight handle, the opposite end whereof is inserted in a metal socket, which is mounted on a horizontal shaft in such manner as to be capable of turning freely thereon, in order that all the mattocks may move independently of each other. Although all the sockets are mounted on the same shaft, the mattocks are arranged so as to work in two rows, by making the handles of two different lengths, and placing them alternately in the sockets. The mattocks of the foremost row enter the earth to the depth of from seven to twelve inches, according to the nature of the soil, while those of the back row work in the place where the front mattocks had previously operated, and penetrate the earth to a greater depth. The shaft that carries the sockets has two movements, viz., a rectilinear motion to and from the carriage in guides carried by the horizontal frame, and an alternate circular motion. To the ends of the shaft are fixed two branch pieces, connected by a cross bar; which bar, by the circular motion of the shaft, is caused at the proper time to press upon an arm that projects from each socket, and thereby to raise the mattocks after they have acted upon the earth, and to bring them into a position to operate upon a fresh surface as the carriage advances. When the mattocks have been raised into nearly a vertical position, they are permitted to fall,—the action of the teeth in entering the earth being rendered more powerful than is due to their weight by the pressure of a large spring. As the teeth penetrate the soil, the shaft recedes from the carriage, and causes them to draw the loosened earth backwards.

[Printed, 2s. 5d. See Patent Journal, vol. 5, p. 54.]

A.D. 1848, March 8.—N<sup>o</sup> 12,080.

EXALL, WILLIAM (*partly a communication*).—“Certain improvements in thrashing machines, and in steam boilers, engines, and other apparatus for driving the same, which apparatus is applicable to driving other machinery.” The Specification contains an explanation of various improvements in steam-engines, and of

an improved portable boiler; but it does not state that the improved steam-engines may be employed in driving machinery for tilling land. Nevertheless the invention is here noticed because it may be applicable to such purpose; and, for the like reason, a notice will be given of similar inventions as they present themselves in order of date.

[Printed, 1s. 9d. See *Artizan*, vol. 7, p. 15; *Patent Journal*, vol. 6, p. 1; and *Engineers and Architects' Journal*, vol. 11, p. 342.]

A.D. 1849, June 20.—N<sup>o</sup> 12,663.

CAMPBELL, ALEXANDER FRANCIS. — “Improvements in wheels, ploughs, and harrows, in steam boilers and machinery for propelling vessels.” Several improvements in ploughs and harrows are described, but without reference to the working of such implements by steam power. There is also an explanation of an improved steam boiler, which is suitable for portable steam-engines for agricultural purposes.

[Printed, 3s. 5d. See *Mechanics' Magazine*, vol. 51, p. 616; and *Patent Journal*, vol. 8, p. 200.]

A.D. 1849, July 7.—N<sup>o</sup> 12,698.

GARRETT, RICHARD. — “Improvements in horse-hoes, pug mills, drilling and thrashing machinery, and in steam-engines and boilers for agricultural purposes.” The patentee describes his improvements in portable steam-engines and boilers, which are mounted on a frame with wheels, “for the purpose of being conveyed from one place to another, and to any locality where the motive power of the engine may be required to drive thrashing, chaff-cutting, grinding, or other machinery.” He does not, however, point out any mode of applying such engines to the working of implements used for cultivating land.

[Printed, 3s. 4d. See *Mechanics' Magazine*, vol. 52, p. 39; and *Patent Journal*, vol. 8, p. 191.]

A.D. 1849, July 18.—N<sup>o</sup> 12,710.

USHER, JAMES. — This invention consists, first, in mounting a series of curved ploughs in the same plane around an axis, so that they shall come into action in succession; and, secondly, in applying power to give rotatory motion to a series of ploughs or other instruments for tilling land, so that the resistance of the earth, as



the ploughs or other instruments enter and travel through it, shall cause the machine to move onward. The machine consists of a steam carriage, the fore part whereof is carried by a pair of ordinary wheels, and the hind part is supported by a broad roller or cylinder and a pair of wheels of like diameter. The roller extends from one wheel to the other, and is fixed on the same axle, which is caused to rotate by gearing connected with the crank shaft of the engine, and thus to impart a slow progressive motion to the carriage. The roller is removable at pleasure, so as to render the bearing parts suitable to the different stages of cultivation to which the machine may be applied. A lever frame at the back of the carriage supports a transverse horizontal shaft, which is driven by gearing from the crank shaft at a greater speed than the hind axle; on this shaft five plates are fixed parallel to each other, and at equal distances apart; and to each plate are attached three ploughs of a curved form, suitable for penetrating the soil in the opposite direction to that in which the machine is advancing, and for elevating and turning over portions thereof. Not only do the ploughs which are set in the same plane follow each other into action, but the several sets are so arranged with relation to each other that two ploughshares will not strike the earth at the same instant. If preferred, each set may be carried by a separate shaft. The patentee remarks, "In the arrangement of apparatus herein-  
 " before described it will be seen that the propelling of the ma-  
 " chine along the land is by reason of the resistance of the land  
 " to the ploughs as they enter and travel through the earth, and  
 " the motion communicated to the wheels or roller. This part of  
 " my invention is applicable where teeth or tines suitable for  
 " tilling the earth are applied about an axis, and will be found to  
 " act better than machines in which tines or teeth around an axis  
 " have had motion communicated to them from the wheels which  
 " run on the land."

[Printed, 9d. See Repertory of Arts, vol. 15 (*enlarged series*), p. 216; Mechanics' Magazine, vol. 52, pp. 70 and 78; Artizan, vol. 10, p. 145; and Patent Journal, vol. 8, p. 224.]

A.D. 1849, November 24.—N° 12,860.

CALLAWAY, GEORGE, and PURKIS, ROBERT ALLÉE.—Part of this invention consists in apparatus for ploughing land by steam power. To the hind end of a steam carriage is attached a large upright frame, carrying at the top a set of three pulleys,

keyed on a horizontal axle, and at the bottom, on each side, a similar set of pulleys,—the three sets of pulleys standing in such positions relatively to each other, that an endless compound chain, which is distended over them, assumes the form of an equilateral triangle. Nine ploughs are affixed to the chain at equal distances apart longitudinally, and in such positions transversely of the chain that they stand in three parallel lines, the 1st, 4th, and 7th ploughs being farthest from the carriage, the 2nd, 5th, and 8th in the middle of the chain, and the 3rd, 6th, and 9th on the side nearest to the carriage. When the chain is caused to travel around the pulleys by the power of the engine, the several ploughs of the three sets successively come into action, forming three parallel furrows while passing between the two lower sets of pulleys; and as the machine at the same time moves slowly onward, the furrows are produced in a diagonal direction across the field.

A modification of the machine is described, in which the endless chain passes in a horizontal direction over two sets of pulleys, and only four ploughs are affixed to the chain. In some cases the patentees attach to the back of the machine a series of rollers, placed upon a horizontal shaft, so as to form a continuous roller, for the purpose of rolling the land at the same time that it is being ploughed; or such roller may be used as the driving wheel of the machine.

[Printed, 1s. 1d. See *Mechanics' Magazine*, vol. 52, p. 437; *Practical Mechanics' Journal*, vol. 3, pp. 106 and 259; and *Patent Journal*, vol. 9, p. 117.]

A.D. 1850, January 17.—N° 12,930.

COWING, HENRY.—“Improvements in obtaining motive-power, and in steam and other ploughs, in land carriages, in fire-engines, in raising water for draining and other agricultural purposes, and in apparatus for evaporating saccharine and other liquors.”

[No Specification enrolled.]

A.D. 1850, March 7.—N° 12,989.

FOWLER, JOHN, junior.—This invention consists principally in improvements in machinery for forming drains in land and for introducing pipes into the drains. A carriage, mounted on five broad wheels or rollers, supports an upright coulter, which extends downwards into the earth, and carries at its lower end a shoe or



share (similar to a mole plough), whereby a small channel is formed at any desired distance below the surface. The drain pipes are strung like bugles or beads upon a rope, fastened to the back of the shoe or share, and consequently they are drawn into the channel or drain as the share advances. The machine is drawn across the field by means of a windlass worked by horses. Two ropes are connected at one end to the windlass barrel, and after passing partly round two pulleys, the opposite ends of the ropes are brought back and fastened to the frame of the windlass. These two pulleys are united by a chain, which passes partly round a third pulley, connected to the draught chain of the carriage; and therefore as the ropes are wound upon the windlass barrel the carriage will be drawn forward.

[Printed, 3s. 2d. See *Mechanics' Magazine*, vol. 53, p. 218; and *Patent Journal*, vol. 9, p. 271.]

A.D. 1850, May 22.—N<sup>o</sup> 13,076.

COTGREAVE, ROBERT.—1. Improved machinery for cutting trenches in order to form drains. The implement consists of a plough beam, having a triangular iron plate extending downward therefrom and carrying at its lower edge a bar, which forms an inclined plane, terminating at the bottom in a cutter or share. The earth, as it is severed by the cutter, ascends the inclined plane and passing on to a mould board, attached to the inclined plane, is deposited thereby at the side of the trench. Two arms, pendent from the forward end of the beam, carry an adjustable block or guide piece, which travels on the soil in advance of the cutter, in order to regulate the depth of cut. This block may be furnished with circular knives to cut the sides of the portion of earth intended to form the slice which is to be separated by the share. Spiked rollers may be employed to assist the passage of the earth up the inclined plane; or a series of rollers, supporting an endless belt, may be applied to the inclined plane. Two inclined planes and cutters may be affixed to the triangular plate, one above the other; or an inclined plane may be fixed to each side of the plate, so as to discharge the earth on both sides of the trench. The patentee remarks, "It will be evident that the arrangements of machinery  
" I have described for cutting trenches may be worked by horses  
" attached thereto, or by any other ordinary method; in some cases  
" it will be advantageous to employ an apparatus similar to an  
" ordinary capstan or windlass, placed at a distance from the

“trenching machine, and connected thereto by means of ropes or chains.”

2. Machine provided with tines, spikes, or scrapers fixed in a triangular frame, intended to be used for filling in the earth which has been removed in the formation of the trenches.

3. Implement for loosening the subsoil, so as to effect an improved drainage thereof.

[Printed, 10d. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 268; *Mechanics' Magazine*, vol. 53, p. 437; and *Patent Journal*, vol. 10, p. 117.]

A.D. 1850, July 3.—N<sup>o</sup> 13,159.

HODGE, PAUL RAPSEY (*a communication*).—This invention includes certain improvements in the boilers of portable steam-engines for agricultural purposes, and in machinery for applying steam power to the working or digging of the soil and mixing manure therewith, when required.

The steam-digging machine is composed of a frame or carriage mounted on four wheels, and supporting a moveable or traversing platform, which carries the spades and their appendages, together with an upright cylindrical boiler and a pair of oscillating steam cylinders. The spades, four in number, are worked at the back of the machine, and are placed at any angle to suit the nature of the soil to be dug. The helms or handles of the spades are connected by rods with a crank shaft, driven by gearing from the main shaft of the engine. Motion is transmitted from the crank shaft to a “tipping shaft,” placed under the lower part of the handles of the spades and fitted with four cams. Each cam is so formed as to allow the spade to be forced into the earth by means of the connecting rod, and to be drawn up again with the sod upon it until the crank to which the rod is attached is perpendicular; then the cam acts against the handle and jerks the sod off the spade, causing it to fall with the grass, or what may be called the upper surface, downward. The helms or handles of the spades are in two parts;—the lower part being a tube and the upper part a solid rod, which is inserted in the tube and prevented by a key or cotter from withdrawing therefrom. The tubular part contains a helical spring, which presses against the end of the rod, in order to keep the handle extended to its full length. The spring is sufficiently powerful to resist the greatest amount of force required to penetrate the soil; but if the spade should come in contact with a large



stone, the spring will yield, and permit the tubular part to slide up the rod. The moveable platform may be traversed to either side of the carriage, or it may be moved around the boiler, which in this case is to be fixed in the centre of the carriage; the object being "to bring the whole weight of the carriage clear of the loose soil previously dug."

[Printed, 2s. 1d. See *Mechanics' Magazine*, vol. 53, p. 478; and *Patent Journal*, vol. 10, p. 162.]

A.D. 1850, July 3.—N<sup>o</sup> 13,165.

HORNSBY, RICHARD.—"Improvements in machinery for sowing corn and seeds and depositing manure, in thrashing-machines, in machines for dressing or winnowing corn, and in steam-engines and boilers for agricultural purposes." The improvements in portable steam-engines and boilers are explained without any reference being made to their applicability to the purpose of drawing or impelling agricultural implements.

[Printed, 6s. 8d. See *Mechanics' Magazine*, vol. 54, p. 38; and *Patent Journal*, vol. 10, p. 200.]

A.D. 1850, July 4.—N<sup>o</sup> 13,168.

TUXFORD, WESTON.—"Improvements in machinery for crushing or pressing land, and for shaking straw; also improvements in applying steam power to agricultural machinery." The improvements in applying steam power to agricultural machinery consist in "arranging the engines of portable steam-engines in houses or closed compartments, so as to apply the power thereof to agricultural machinery under more favorable circumstances;" but no agricultural machines or implements are particularized.

[Printed, 2s. 10d. See *Mechanics' Magazine*, vol. 54, p. 38; and *Patent Journal*, vol. 10, p. 210.]

A.D. 1850, August 12.—N<sup>o</sup> 13,222.

THOMPSON, GEORGE.—Machinery for cutting, digging and turning up earth, to be drawn by horses, or worked by steam or other power. The machine travels upon a pair of large wheels, but part of the weight is also borne by two wooden rollers behind them. Two rows of spades are connected at their upper ends to a couple of horizontal crank shafts, which extend across the machine, and are caused to rotate by gearing from the running wheels. In

the lower part of the stock or stem of each spade is formed a circular opening to receive a short spindle, which moves freely therein; and upon the ends of the spindle there are guide wheels, working in guide frames suspended from the crank shaft. As the upper end of the stock accompanies the crank in its rotation, the spindle ascends and descends in the guide frames, serving as a shifting fulcrum or axis on which the stock turns or oscillates; and the spade is thereby caused to dig or scoop out a portion of earth, and deliver it into a vibrating box, by which it is turned over and deposited upon the land.

A modification of the above arrangement is described, in which the spades or cutters are arranged in one row, and are all connected to the same crank shaft. In lieu of the guide wheels before mentioned, each end of the spindle is inserted in an opening at the centre of a short guide piece, the ends whereof are fitted into eyes at the bottom of two guide rods, which slide through bushes bolted to the guide frame.

In some cases the front part of the machine is furnished with a row of coulters or cutting instruments, for cutting the earth previous to digging.

Forks, or any other description of instruments which it may be thought desirable to use, may be applied to the stocks, instead of the spades.

A spade is represented in the Drawings with the stock jointed near the lower part, and having a spring to keep it firm.

[Printed, 1s. 1d. See *Mechanics' Magazine*, vol. 54, p. 137; and *Patent Journal*, vol. 10, p. 238.]

A.D. 1850, October 17.—N<sup>o</sup> 13,285.

FOWLER, JOHN, junior.—This invention relates to the machinery described at No. 12,989, for forming drains in land, and for introducing pipes into the drains. There are several improvements in the apparatus for raising and lowering the plough and adjusting its inclination, and also in the construction of the carriage, which in this case is provided with seven wheels: viz., two broad wheels at the front end, three wheels of less breadth near the hind end, and two narrow wheels of large diameter at the hindmost part of the frame. The draught bar of the carriage is attached to a frame that travels in front of the plough upon a small roller, and carries a pulley, around which a wire rope passes, connecting the plough to a windlass; or, when the plough is



required to go faster, the pulley is dispensed with, and the rope from the windlass is connected to the draught bar. The windlass barrel is keyed to an upright axis, which turns in bearings in a bed-plate and in an arched support affixed to the plate. To the back edge of the bed-plate is jointed a plate, termed an "anchor," which is let into the ground when the apparatus is in use, and serves, in conjunction with a stay bar and retaining chains, to hold the windlass in its proper position.

[Printed, 4s. 11d. See also No. 12,989. See *Mechanics' Magazine*, vol. 54, p. 337.]

A.D. 1851, March 24.—N° 13,564.

GUTHRIE, GEORGE.—This invention consists in a machine for digging land by steam or other suitable motive power. A steam carriage is described, mounted on four wheels with broad rims or tires, to enable it to pass easily over the land. At the back of the machine are several grapes, forks, or spades, which are successively caused by the steam-engine, through the intervention of cranks and gearing, to enter the earth; then, by a motion approximating to that of the ordinary spade in digging by hand, to raise a portion of the soil; and on arriving at a horizontal position, or nearly so, to make a semi-revolution and throw off the earth. During this movement, the machine is advancing at a slow rate, so that when each grape, fork, or spade again descends, it will scoop or dig away a fresh piece of the ground.

In some instances it is necessary to cut through the surface of the earth in parallel lines between the grapes, in order that the latter may act with more ease and certainty of effect. For this purpose, a shaft, carrying a series of cutting discs, is applied to the machine in a horizontal position, near the ground, and just in front of the line of grapes. The discs are pressed into the earth, and as the machine moves onward, they revolve and make a series of parallel cuts.

It is likewise stated that "the necessary digging action may be effected by grapes fast on a continuously revolving shaft, having fixed or adjustable scrapers, so planned as to remove the earth carried up by each grape in its revolution,—the object in all cases being to produce a mechanical digging action, assimilated as closely as possible to the principle of manual digging."

[Printed, 10d. See *Mechanics' Magazine*, vol. 55, p. 278; *Practical Mechanics' Journal*, vol. 4, p. 250; and *Patent Journal*, vol. 12, p. 15.]



A.D. 1851, September 25.—N<sup>o</sup> 13,757.

BROWN, DAVID STEPHENS.—“An improved agricultural implement.” In the Specification the patentee says, “The nature of my invention consists in the adaptation of revolving cutters or blades to till the soil; and the manner in which my said invention is to be performed is as follows:—Upon a framework I mount spindles, to the lower ends of which cutters or blades are fitted; and I communicate rotary motion to them by means of wheel gearing from any prime mover. The rotary motion of the cutters, and the manner in which they are disposed, cause them to enter, break up, and pulverize the soil.” The machine represented consists of a frame or platform, which travels on three wheels, and carries two rows of spindles,—one row extending across the frame near the middle of its length, and the other row across the hinder part. The spindles of each row incline downward through the frame, so that their lower ends, which carry the cutters, will enter the earth; and the two sets are so arranged with respect to each other, that each cutter of the back set will work in a line drawn from the centre of the space between two cutters of the front set. The upper ends of the spindles are fitted with bevel wheels, gearing into corresponding wheels on two horizontal shafts, which are put in motion by a steam engine (mounted upon the framework of the implement, or on a separate truck) or other motive agent; and thus the cutters are caused to rotate and break up the soil. The bearings of the spindles are jointed to the framework, so as to admit of any particular spindle or of all the spindles and cutters being raised out of the ground. The size and shape of the cutters may be varied according to the nature of the soil.

[Printed, 8d. See *Mechanics' Magazine*, vol. 56, pp. 277 and 301.]

A.D. 1851, October 23.—N<sup>o</sup> 13,786.

PAPE, JOHN HENRY.—The patentee describes a mode of applying steam power to impel a plough. A large hollow cylinder, with a flange at each end to roll over the ground, is connected to the frame of the plough by its axle, which is hollow. This axle supports a steam boiler and fire grate within the cylinder. The smoke passes through one end of the axle into the atmosphere; and the steam passes through a valve into an ordinary steam cylinder, sus-



pended from the other end of the axle. The piston rod projects downward from the cylinder, and is furnished at its lower end with a foot or claw; so that when the piston is forced downward by the action of the steam, the foot or claw will take hold of the ground and impel the plough,—the large cylinder at the same time rolling onward. After each down stroke, the piston is raised again by a spring.

A modification of this arrangement is represented, in which a steam cylinder is attached to each end of the hollow axle of the large cylinder, and the ends of the piston rods are fastened to crank pins on the sides of two wheels, intended to run on the land. These wheels are connected to the frame of the plough; and they are made with broad peripheries, studded with nails or projections to give them a firm hold of the ground.

The patentee also proposes to use gunpowder, gun-cotton, or other explosive substance as the moving power, instead of steam.

[Printed, 9d. See *Mechanics' Magazine*, vol. 56, p. 358.]

A.D. 1851, December 1.—N<sup>o</sup> 13,836.

EXALL, WILLIAM.—“Improvements in certain agricultural implements, and in steam engines and boilers for driving the same.” The agricultural implements here referred to are chaff-cutting machines, thrashing machines, and reaping machines. Certain improvements in steam boilers and in portable and fixed engines for agricultural purposes are also explained; but the patentee does not describe any particular mode of applying steam power to give motion to agricultural implements.

Although the reaping machine is to be drawn by horses, yet it may be advisable to explain that the frame is carried by small wheels or rollers, and by a large broad wheel, called the driving wheel, which is connected by suitable gearing with the cutters and other moving parts of the apparatus, in order to actuate the same. It is formed with teeth or ribs around its periphery, to give it a firm hold of the ground and ensure its rotation as the machine is drawn onward.

[Printed, 1s. 1½d. See *Mechanics' Magazine*, vol. 56, p. 476.]

A.D. 1852, January 31.—N<sup>o</sup> 13,943.

ROBERTS, MARTYN JOHN.—This invention includes a machine for digging, tilling, or breaking up land, to be drawn either by

horse or steam power. In two parallel discs, fixed together by a horizontal tube of less diameter, sixteen equidistant holes are made near the outer edge in the form of a circle, for the purpose of receiving a corresponding number of rocking shafts, which carry the tines employed for breaking up the land. The ends of the rocking shafts are furnished with cranks, connected by rods to a cranked axle which extends through the tube and is fixed to the framework of the machine. As the machine is drawn onward, the tines penetrate the earth and the discs turn upon the axle, so as to bring each row of tines in succession into action, while at the same time a rocking motion is imparted to the shafts by their connexion with the cranked axle; the object being to obtain by the onward movement of the discs, their revolution around their axis, and the rocking of the shafts, such a motion in the tines as shall cause them to enter the earth with the least possible effort, and to leave it in the best position to carry up earth with them. The patentee says, "The action of this machine, when at work, is similar to the action of Morgan's feathering paddle wheel, where the floats may be supposed to resemble the tines, with this difference, that in my digging machine, though I cause the tines to enter the earth with as little effort as possible, as does the paddle wheel into the water, yet in the paddle wheel the object is to have as little back-water as may be, whereas in my digging machine I endeavour to obtain as much earth thrown up as possible." The tines are freed from any adhering earth, stones, &c., by passing between a series of bars, curved to the form of segments of circles, and fixed excentrically to the course or path of the tines.

[Printed, 1s. 3d. See *Mechanics' Magazine*, vol. 57, p. 122.]

A.D. 1852, March 24.—N<sup>o</sup> 14,036.

PIDDING, WILLIAM.—The fifth part of this invention consists in certain improvements on the second head of a former invention for which Letters Patent, No. 11,460, November 21, 1846, were granted,—such second head relating to three methods of laying down rails or metal plates for carriages to travel upon. The first of the present improvements consists in making each plate or link of the endless band or chain, described under the third method, with a semicylindrical rib to fit in a recess in the "shoe" or chair, and connecting the latter with the plate by springs at each side.



Causing the endless series of rollers (described in the second part of the former Specification) to travel upon a perfectly circular rail, which rolls along the ground, and is kept in a vertical position by a large frame, fitted with friction rollers in such manner that the circular rail works freely between the rollers. The patentee says, "This mode of conveyance may be applied for goods and passengers, or otherwise for ploughing, harrowing, irrigating, sowing, manuring, or other agricultural processes, over roads, hills, or ditches, on uncultivated as well as cultivated ground, by the modified arrangement shown in Figure 7." In this arrangement the circular rail is composed of rings or endless bands of gutta-percha, india-rubber, or compounds thereof, and pliable rings or endless bands of metal, placed alternately. It is proposed "to apply heat to the elastic material when off the ground, and cold to the metal, so that when it comes in contact with the gutta-percha, &c., which it will do when the endless chain of antifriction rollers runs over the gutta-percha and metal, the latter will convey or communicate its cold to the former, and make it sufficiently rigid to bear a considerable weight without bending." "The whole can be propelled by steam or other convenient motive-power, or by animal or manual strength."

"Another mode of construction consists in the use of a wheel, formed of a tube of india-rubber, compound thereof, or other suitable material, filled with a fusible metal, such as mercury, tin, and bismuth, or mercury, lead, and bismuth, or any other such admixture as may be found most serviceable in practice, or with certain or various resinous, waxy, greasy, bituminous, or other suitable substance or substances or compound, or with brimstone or other substance or substances, which by the application of heat become liquified, and by the application of cold resume or assume the solid state." The patentee also uses endless bands, composed of plates of copper or other suitable metal, connected by vulcanized india-rubber. He says, "To these metal plates I convey different degrees of temperature, producing heat and cold rapidly; and I thus liquify and solidify the fusible metal or other appropriate meltable substance in the interior of the band; and the india-rubber connexions between each metallic plate, and at the sides, allow the band to bend when the fusible metal or substance aforesaid in the interior is liquified." "To add to the strength of any of the above materials, substances, or compounds, I in certain cases insert in the tubes,

“ in addition to the said substances, solids, such as plaister of Paris, chopped whalebone fibres, chopped hemp or flax, sawdust, chopped wire, or any suitable infusible material or materials, calculated to add strength to the substances aforesaid or compounds, when not in a melted state. The endless chain of antifriction rollers before described, running round rails, both of which are to be rendered cold by artificial means, are made to run on such a tube, and heat is applied to the remaining portion, to melt the substances or compounds contained therein.” The rails mentioned in the last sentence form part of the frame that carries the rollers.

[Printed, 9d. See *Mechanics' Magazine*, vol. 57, p. 299.]

A.D. 1852, July 29.—N<sup>o</sup> 14,243.

MARTIN, JOHN.—The subject of this invention is a machine fitted with rotary hoes for hoeing turnips and other crops by horse-power. It is introduced into this series of Abridgments for the reason given at No. 7118. The body of the machine is supported by a pair of large wheels, “hooped with ribbed or serrated metal, in order to secure them a hold on the earth.” The hoes are fixed to horizontal shafts, turning in bearings in a frame, carried by four small wheels; these wheels being adjustable for the purpose of regulating the depth at which the hoes are to act. Rotary motion is given to the shafts by gearing from the large running wheels; and as the machine is drawn along the lines of turnips or other plants, each set of hoeing arms hoes or earths up one side of a row of plants, leaving them in readiness for being “singled” by hand in the usual way.

[Printed, 6d. See *Mechanics' Magazine*, vol. 58, p. 136.]

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## PATENT LAW AMENDMENT ACT, 1852.

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A.D. 1852, October 1.—N<sup>o</sup> 44.

HODGSON, JAMES.—“Improvements in machinery for draining land.” “This invention consists of applying to a carriage (which is progressively moved over the land) a cutting tool, which is caused to descend and rise vertically or nearly so (like a slotting tool), to the depth of the desired drain; the earth being removed by a second tool, which is caused to descend with the cutter, and to come forward under the cut earth, and to rise with the cutter and discharge the earth. These tools are worked by steam or other power.”

[Printed, 2½*d.*]A.D. 1852, October 1.—N<sup>o</sup> 86.

KYLE, DAVID DUNNE.—This invention relates to machinery for excavating and removing earth, and it is introduced because the patentee in subsequent Letters Patent, No. 2887, December 21, 1855, refers to the agricultural use of his machine for excavating and removing earth. The machine consists of a long rectangular frame, supported by five pairs of small wheels, which travel upon rails laid on the surface of the ground to be excavated; each rail being made with a rib along its upper surface, and each wheel having a corresponding groove in its periphery, to fit thereon. The carriage is impelled by means of levers or legs acting against moveable fulcra, which are heavy blocks, formed with teeth or indentations on the under side, to fit into racks made on the upper surface of the rail at each side of the rib. On the side beams of the frame, near the middle of their length, are fixed the bearings for a horizontal transverse shaft which carries the excavating implements. Six sector racks are keyed on this shaft at equal distances apart, in the direction of its length, and in such positions

relatively to each other that, when viewed laterally, they present the appearance of a complete toothed wheel. The racks gear into spur wheels, which are caused to rotate by the moving power of the machine, and thus to carry round the racks with the parts attached thereto. Curved blades or cutters, for ploughing up the face of the excavation, are connected to the sector racks by pins on which they can turn freely, being kept up to their work, when rising through the earth, by weighted levers affixed to their inner ends. The racks also carry a series of short crowbars or levers, which slide in radial guides, descending into the earth as they pass beneath the transverse shaft, and being caused to ascend through the soil by the advancing motion of the racks. The loosened earth is collected by forked teeth or cutters into buckets, which are successively raised and emptied as the shaft revolves.

“Another apparatus for breaking the surface of the ground may be applied to the machine above described. It consists of a series of spiked wheels, either rigid or elastic, which work on an axle; this axle is held by a bar, which may be attached to any part of the machine and loaded to any required extent, according to the nature of the ground. As the machine revolves, the spiked wheels are drawn along with it, and receive a rotatory motion by their contact with the ground, which they enter, thereby breaking up the surface, and leaving the earth loose to be taken up by the buckets.”

When excavating ground which is intersected by roots, saws may be attached to the machine for the purpose of cutting through them. The machine may be provided with one or more powerful levers or rams for removing large obstacles. In cases where the peculiar nature of the ground renders it necessary, a jet of steam or water may be employed for softening the soil.

[Printed, 7½d.]

A.D. 1852, October 1.—N<sup>o</sup> 89.

MARSHALL, JAMES NICHOLS. — “An improved wheel for carriages and other vehicles.” This wheel carries with it the road or rails on which it travels, and is also applicable to agricultural implements. It is thus described in the Provisional Specification:—“Two gco wheels, made fast one on each side of the tire of a wheel; fourteen revolving cog rails, each ten inches long; fourteen revolvers for the cog rails to work and turn on a pivot



“ that runs through the revolver and through the rails, and made fast to the tire of the wheel, with a joint that will allow the revolver and the rails to lay flat on the ground while the cog wheel passes over it; and so in succession as one is laid down the hinder one is taken up and carried round, forming a constant revolving road for the wheel to work upon.”

In the Final Specification, the patentee describes his invention in the following manner:—“ First, an improved perpendicular wheel for carriages and other vehicles, on the scale of five feet, made of wood, with an iron cog tire. Second, twenty wooden rails, attached to an iron plate, with cogs to fit the cogs of the tire on the wheel, each nine inches long, to girt the wheel, three inches deep, and the same width as the iron tire. The rail has a steel bolt, with a pivot on each end, fixed in the centre, working in two steel collars, bolted each side of the tire. These collars leave room for the rail and revolvers to lay flat on the ground, and by them are carried round the wheel and kept firm in their places. An iron pivot passing through the wooden rail is fastened to the steel bolt in the centre for the rail and wheel to turn on the revolver,—there being as many revolvers as there are rails. The revolvers are turned twenty-seven inches girt, horizontal top and concave bottom, with iron bands. The pivot from the rail passes through the centre of these revolvers, is screwed on the rail, and acts jointly with the rail and wheel. These revolvers may be made either of iron or wood,—the wood acting better for a plough, &c., and the iron for the common road.”

[Printed, 2½d.]

A.D. 1852, October 1.—Nº 92.

LAWES, THOMAS.—An agricultural implement, consisting of an iron roller, with curved tines projecting therefrom in rows from one end of the roller to the other,—each row presenting the appearance of a broad digging fork or hop spud. The implement is drawn over the ground by “ horse power or otherwise;” and as the roller revolves, the rows of tines penetrate the earth and raise it “ in a manner somewhat similar to digging with the implement before mentioned.” The tines are freed from the earth by pieces of iron of a suitable shape, suspended from the rail at the top of the implement.

[Printed, 7½d.]

A.D. 1852.....N<sup>o</sup> 92\*.

LAWES, THOMAS.—Disclaimer and Memorandum of Alteration to the Specification of Letters Patent, No. 92 (1852). Filed in the Great Seal Patent Office, August 22, 1855.

The Specification concludes in the following manner:—"Having described the nature of my invention, and the manner in which it is to be performed, I claim the method described of tilling or turning up the ground by means of tynes or prongs, projecting from a rotating cylinder, as herein-before set forth." These words the patentee believes to be liable to misinterpretation, and he therefore disclaims them.

[Printed, 3*d*.]A.D. 1852, October 2.—N<sup>o</sup> 153.

BROWN, DAVID STEPHENS.—"An instrument for scratching or scraping the ground with a view of loosening and pulverizing the soil, which it leaves in the same state as if it had been scratched by a mole or a rabbit." A large cylinder, turning in horizontal bearings, carries three elastic radial arms, fixed at equal distances asunder around its periphery,—two of such arms being furnished at their outer extremities with three rows of teeth, and the other arm carrying a cylindrical brush. The bearings of the cylinder are at the hind ends of two long beams, which are capable of turning upon a horizontal axle, supported by two uprights or pillars upon a four-wheel carriage; and the front ends of the beams are weighted, so as partly to counterbalance the weight of the cylinder and permit it to accommodate itself to inequalities of the ground. The carriage contains a steam-engine or other moving power, which winds up a rope attached to some fixed object, and thus causes the carriage to advance, while at the same time it imparts a rotary motion to the cylinder. As the cylinder rotates, the soil is scratched by the teeth to any depth, and then thrown back and swept by the said teeth and brush in a fine pulverized state behind the instrument." Instead of the arms being elastic, they may be provided with spring joints at the ends where they are attached to the cylinder. A set of three scrapers may be substituted for the cylindrical brush.

[Printed, 4*½d*.]



A.D. 1852, October 21.—N° 480.

FOWLER, JOHN, junior.—Relates to machinery for forming drains in land by steam power, and consists in so arranging the parts that the boiler, steam-engine, and coulter or cutter are all combined and go together,—the steam-engine giving motion to a drum to wind on a wire rope, and thus to move itself up to an anchor or fixed point on the land. The invention also includes an improved form of coulter, which is made of less thickness at the back than the more forward parts, in order to reduce friction. The machine is furnished with an upright coulter and a shoe or share for forming the drain and drawing a continuous series of drain tiles into it, like the apparatus protected by Letters Patent Nos. 12,989 and 13,285. A steam-engine and boiler are fixed upon the carriage, which travels on four broad wheels, and carries at its front end a large drum. The end of a wire rope is conducted from the drum to the opposite side of the field, passed around a pulley attached to an anchor or holdfast, and then brought back and fastened to the frame of the carriage; so that on the drum being put in motion by the engine, it winds up the rope, and draws the machine towards the anchor. If greater speed be required, the pulley is dispensed with, and the end of the rope is secured to the anchor. When the machine has arrived at the anchor, the power of the engine is applied to turn a small drum, around which is passed a rope from an anchor situated at the place where the machine is to recommence its action; and as the carriage is thus drawn back to the opposite side of the field, the large drum pays out or delivers its rope in readiness for the next forward movement of the machine. The patentee states that for some purposes he prefers to perform the operation of delivering or paying out the rope from the large drum by turning the front wheels by any convenient gearing worked by the engine, so that the bite of such wheels upon the land shall act to drive the machine in the requisite direction.

[Printed, 10½d. See also Nos. 12,989 and 13,285.]

A.D. 1852, November 2.—N° 621.

SAMUELSON, BERNHARD.—This invention relates to that class of agricultural implements in which numerous teeth or tines, fixed to or moving on an axis or axes, are employed to penetrate and lift the soil, in order to break up or till the land. It consists in

forming the teeth or tines of steel, and, by preference, each tooth or tine is curved, proceeding from its inner end regularly to a point or chisel-edge at its outer end. They may be applied to implements worked by horse, steam, or other power.

[Printed, 9½d.]

A.D. 1852, November 5.—No. 641.

HALL, COLLINSON.—The nature of this invention is thus defined by the patentee:—“My improvements,—which have for their object the conveyance of loose solid and fluid matters, such as night-soil, sewage, liquid manure, and various sorts of grains, seeds, fibrous substances, and animal and vegetable matters adapted for food, with a smaller exertion of power, especially over uneven ground, sandy or marshy soils, or in other unfavourable localities than has hitherto been requisite, and partly the continuous agitation of some such matters, such as night-soil, sewage, and liquid manure during their carriage, wherever such agitation may be useful in preventing the deposit of a sediment,—have reference, firstly, to the construction and employment of a revolver or carriage formed by one or more drums or cylindrical vessels, furnished with a central axis or gudgeon, and with projecting rims or disks, provided with shafts, traces, bands, straps, or chains, through the intervention of which they may be drawn or driven by horse, steam, or other motive-power; —the inner surface of the said drums or cylindrical vessels, when more than one are employed in a revolver or carriage, being connected, if required, by several rods or bands of metal, gutta-percha, or other convenient material; and the outer circular surfaces thereof fitted, if required, to bags or receptacles adapted to loose solid or fluid matters to be carried in the said revolvers. My improvements consist, secondly, in constructing and employing a train or series of carriages or revolvers, similar to the above, which can be drawn by one and the same motive-power, and which is formed by connecting the central axes or gudgeons of several of the said revolvers by rods, chains, bands, or other suitable contrivances.”

Machines constructed according to this invention may be used for rolling land, as well as for distributing water or liquid manure by the agency of a syphon. With regard to the latter object, the patentee remarks,—“My improvements above described, as ap-



“ plicable to the distribution of liquid manure, ensure its equal  
 “ strength and thickness on the land wherever it is distributed by  
 “ the syphon; a seed drill may also be attached to the frame of  
 “ the apparatus for the sowing of turnips, mangel wurzel, or other  
 “ seeds.”

[Printed, 6½d.]

A.D. 1852, November 16.—Nº 764.

CHRIPPES, THOMAS, the younger.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* It consists in effecting the operations of ploughing or digging up, harrowing, and preparing land for seed, manuring and sowing land, and reaping the crop, by means of a steam or power engine, fixed upon a frame mounted on wheels or rollers, “ which should be of  
 “ larger area than the engine, to enable it to travel with facility  
 “ over ploughed fields, &c.” Within the frame there is a drum, turned by the engine, for winding up a wire rope connected to the plough, harrow, or other implement which is to be drawn over the land. For sowing, or for manuring with dry manures, a wire sieve is attached to the engine, and caused to scatter the seed or manure.

[Printed, 2½d.]

A.D. 1852, December 3.—Nº 949.

BETHELL, JOHN.—Apparatus for excavating earth for the formation of railways, and for digging or cultivating land. “ The  
 “ apparatus consists principally of a rotary digger, which is  
 “ adapted to a steam-engine of the kind usually employed for  
 “ agricultural purposes. Engines of this construction generally  
 “ consist of a locomotive boiler, with the engine and other appur-  
 “ tenances adapted thereto,—the whole being mounted on a  
 “ carriage with four or more wheels, for the facility of removal  
 “ from one place to another. The rotary digger consists of a  
 “ drum or shaft, round which are arranged in a helical direction  
 “ a number of prongs or tines. This digger turns in bearings  
 “ made at the end of a frame or a pair of lever arms, secured to  
 “ either the front or back part of the carriage in such a manner  
 “ that it may be raised or lowered as may be required;” and  
 motion is communicated to it by means of a band, which passes

from a rigger or pulley on the crank shaft of the engine to another rigger on one end of the digger shaft or drum. For digging or cultivating land, the digger is placed behind the machine, which is drawn slowly over the ground by horse or other power; and the digger being at the same time caused to rotate, the tines cut away the earth and throw it backwards.

[Printed, 10½d.]

A.D. 1852, December 6.—Nº 965.

MURPHY, DENIS JOHN.—*This invention did not proceed to the Great Seal.* It consists in “employing with either steam or horse-power, and also by manual labour, an armed cylinder or cylinders for cutting, turning up, and pulverizing the ground at any required depths for agricultural or other purposes.” The inventor’s first idea was to employ a machine having only one cylinder, armed with numerous fixed cutters; but in this case it was necessary, in order to suit various soils, to provide several cylinders armed differently, and to substitute one for another, as occasion might require. This difficulty was overcome by forming the shanks of the cutters into screws, and securing them to the cylinder by nuts; for as the cutters could be adjusted to any angle, only one cylinder was necessary. As an improvement upon the single cylinder machine, it is proposed to use one with two cylinders. The machine represented in the drawing attached to the Provisional Specification is furnished with a pair of running wheels, and contains two horizontal cylinders, placed one before the other, and caused to rotate by gearing from the axle of the running wheels, when the machine is drawn along by a locomotive steam-engine, or by horse-power. Numerous broad blades or lancet-shaped cutters project radially from the periphery of each cylinder; the cutters of the front cylinder being placed with their sides parallel to the ends of the cylinder, whilst those of the second cylinder stand with their sides at right angles to its ends. “The first cylinder cuts the soil at any required depth in a direct line with the motion given; the second cylinder cuts it at right angles to the first cutting, and turns up the earth to be crushed by the clod bruiser, attached to the carriage by a toothed rack and wheel; and, finally, it is pulverized by the common harrow, which is also connected to the machine by chains.”

[Printed, 5½d.]



A.D. 1852, December 9.—N° 1009.

ALLCHIN, WILLIAM.—“Improvements in agricultural and other steam-engines.” This invention consists simply in so arranging and constructing certain parts of portable or locomotive engines that a great portion of the loss ordinarily sustained from the radiation of the heat and the condensation by exposure to the external atmosphere may be prevented.

[Printed, 5½*d.*]

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## 1853.

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A.D. 1853, January 21.—N° 158.

CURTIS, WILLIAM JOSEPH.—This invention relates to machinery, actuated by steam, for “excavating or digging earth, “ and for carrying or delivering the soil.”

1. Machine for excavating a canal or a cutting for a road or railroad, consisting of a carriage travelling on rails and supporting a steam-engine, which works a series of long upright picks, formed like the stampers of an ore-crushing mill, but having their lower ends suitably shaped to cut or break up the soil. The loosened earth is raised by a chain of dredging buckets, and delivered to an endless series of buckets, trays, or small waggons, by which it is discharged. The machine is provided with two winding drums, each having a separate rope, connected to a distant anchor or post fixed in the ground; and when one drum is caused by the engine to wind up its rope in order to draw the machine, the other drum unwinds its rope in readiness for the return movement.

2. Machine for cutting a drain or trench in the ground. A portable or locomotive engine draws forward the carriage containing the digging apparatus, and at the same time gives motion to the upright picks by which the ground is broken up: in some cases the engine is provided with a barrel to wind up a rope fastened to a distant object, and thus ensure a regular progressive movement. The digging apparatus is furnished with two sets of

picks. The first set penetrates a short distance into the ground, and the broken soil is taken up by a fixed scoop or shovel ("somewhat like a ploughshare") and discharged on one side of the trench. The second set of picks penetrates deeper, and the loosened earth is thrown by another scoop or shovel on the opposite side of the trench. Any desired number of sets of picks and shovels may be employed.

3. Machine for filling in the trench cut by the machine just described. It is supported at the middle of its length by a broad wheel with ribs on its periphery, and at the hind end it is carried by a roller.

4. Machine for excavating a dock or other work under water.

5. Machine for excavating soft land not requiring the aid of picks. Two locomotive engines travel on elevated railways at the sides of the ground to be excavated. A long frame, supported above the ground by rollers or broad wheels, extends from one locomotive engine to the other, and carries an endless series of trays, buckets, or small waggons, by which the earth raised by a "quadruple plough" is received and discharged. The plough is drawn to and fro by means of double drag ropes, connected to a winding drum on each engine, and fastened at their ends to a small barrel on each end of an axle which extends horizontally across the middle of the plough-frame: when this axle is turned by means of a hand-wheel, the small barrels take up the drag rope on one side and let out the drag rope on the opposite side, and thus the plough is steered in either direction. The plough-frame is supported at each end by a roller, and at the centre by wheels which travel on the frame of the soil-delivering apparatus. At each extremity of the plough-frame are fixed two ploughs with an inclined plane or sole-plate between them, up which the earth rises and passes between curved guide plates into the trays or waggons of the delivering apparatus.

The soil-delivering apparatus may be used when excavating by hand labour,—the men working in line, and pitching the soil into the trays or waggons as they pass in constant motion.

[Printed, 2s. 6½d.]

A.D. 1853, February 9.—N° 342.

NEWTON, WILLIAM EDWARD (*a communication*).—*This invention received Provisional Protection, but notice to proceed with*



*the application for Letters Patent was not given within the time prescribed by the Act.* "The machine or apparatus which forms the subject of the present invention is intended more particularly for digging or cutting ditches or drains and removing the earth therefrom, and consists principally of a rotating wheel, to which a number of shovels are attached. This wheel is mounted in a frame, and the hinder part of the wheel is enclosed in a box or chamber. To the lower part of this chamber a share and mould-board are fixed. The share cuts away or loosens the earth for a subsequent operation, when the rotating shovels will raise the loose earth, and throw it on to wing pieces, which are attached to the sides of the apparatus, and from which wings it will fall into carts, whereby it may be removed to any convenient place for deposit. The apparatus is to be drawn forward by horses, and the onward progress thereof causes the wheel with the shovels attached thereto to rotate and scoop up the earth that has been loosened by a previous operation."

This machine is noticed because, in a modified form, it may be actuated by steam-power and employed for digging or breaking up land.

[Printed, 2½d.]

A.D. 1853, February 28.—N° 497.

GILGENHEIMB, THEODORE Baron Von.—*This invention did not proceed to the Great Seal.* It consists principally in machinery for digging land by means of a series of spades or digging forks, the short helvcs or handles whereof are inserted in the periphery of a vertical wheel, which rotates as the machine is drawn onward, and thereby causes the several spades or forks in succession to enter the soil; and as each spade or fork is raised therefrom by the continued movement of the wheel, it is turned partly round by suitable apparatus, so as to throw over the earth which it has lifted. The machine may have more than one digging wheel; and it may be fitted behind with an apparatus for crushing the clods and freeing them from any roots which they may contain. Or the machine may be furnished with apparatus to receive the earth from the spades or forks, for the purpose of breaking it up and disengaging therefrom all weeds or fibres, which fall into a furnace and are consumed. Apparatus for sowing seed may likewise be attached to the machine.

[Printed, 7½d.]

A.D. 1853, April 13.—N<sup>o</sup> 886.

CLAYTON, NATHANIEL, and SHUTTLEWORTH, JOSEPH.  
—"An improvement in portable and locomotive steam-engines."  
Placing the cylinder or cylinders in a steam chamber or jacket within the smoke box, to prevent condensation of steam within the cylinder and radiation of heat therefrom.

[Printed, 2*½*d.]

A.D. 1853, May 10.—N<sup>o</sup> 1151.

JOHNSON, JOHN HENRY (*a communication from Robert Romaine*).—Digging, pulverizing, levelling, drilling, and rolling the soil, sowing seeds, depositing manure, reaping and mowing, making drains, and performing other agricultural operations by mechanism actuated directly by a steam-engine, but traversed or conveyed over the land by horse power or by the power of an additional steam-engine. The machine is supported by a pair of large fore wheels, made with very wide tires to prevent them from sinking too deeply into the soil, and by a pair of hind wheels of smaller diameter, but with the same width of tire. The machine consists mainly of a "box cart," in which, immediately in front of the axle of the large wheels, is fixed an upright tubular boiler, carrying a vertical inverted steam cylinder and its appendages, whereby motion is given to a tubular shaft, revolving loosely on the axle just mentioned. At the back of the machine there is a digging cylinder, composed of a series of longitudinal bars, armed with picks, forks, or knives of any convenient form, and supported by transverse discs fixed on a horizontal axle, which is connected by gearing with the tubular shaft, and turns in bearings in the rear end of a lever frame. This frame fits loosely on the outer ends of the axle of the large wheels, and is suspended at the rear end from an adjusting screw. The digging cylinder revolves and throws up the earth beneath an inverted box, termed a "levelling box;" at the hind part of the box there is a seed box or receptacle from which the seed descends through pipes into the ground; and the pulverized earth is levelled by the back edge of the box. The hind part of the levelling box is supported by a small roller, which follows it; and from this roller motion is transmitted, by an endless cord, to the apparatus for delivering the seed into the seed pipes. Manure may be also deposited in like manner in the earth.



The machine can be adapted to the cutting of drains, by reducing the length of the digging cylinder, and arranging the apparatus so as to enable it to cut to any required depth.

A reaping or mowing apparatus may be applied to the machine in place of the cultivating apparatus. In this case the machine must move in the contrary direction (that is, with the small wheels foremost); and therefore the horses must be reversed in the shafts. A platform is hinged to the axle of the small wheel, and is suspended and adjusted by an adjusting screw. The front edge of the platform is serrated or formed with fingers to gather in the standing grain, which is then cut by small curved blades or scythes, fixed in pairs on the bosses of small pinions beneath the platform; such pinions being driven by gearing from the tubular axle before mentioned. As the grain is cut, it falls into a series of receiving arms, arranged in pairs, being hinged to rails (fixed above the platform), and kept closed by springs. As fast as the several pairs of arms are filled, the attendant presses down the grain, and the arms opening permit it to fall on the platform, where it is immediately bound up in the form of a sheaf. For mowing, the cutting apparatus is to be placed above the platform, which is to be brought nearer the ground.

A modification of the cart and actuating mechanism is described. The body of the cart is shortened, and the whole apparatus is arranged in a more compact form. The upright tubular boiler is fixed at the end of the cart on one side, to leave room for the cranks of the driving shaft; which shaft extends lengthwise of the machine, and is put in motion by a pair of inverted steam cylinders, fixed to a plate at the side of the boiler. The turning of the machine at the headlands is facilitated by elevating the hind-wheels, and thus throwing the whole weight of the implement upon one pair of wheels.

"The cart containing the motive-power, with the boiler and engine, may be applied to general farm purposes, such as thrashing, cleaning grain, cutting wood, pumping water, &c."

[Printed, 1s. 2½d.]

A.D. 1853, May 19.—N<sup>o</sup> 1240.

HIPPISLEY, JOHN.—"Improvements in steam engines, suitable for agricultural purposes and to locomotion on common roads." The patentee says, "My invention consists in a slow motion

“locomotive, which may however become a stationary engine, and its power applied to various agricultural purposes.” He describes the construction of the engine, but does not explain how it is to be applied to agricultural purposes.

[Printed, 5½d.]

A.D. 1853, June 3.—N° 1365.

WILSON, JAMES SPOTSWOOD.—Machine for digging or raising earth, to be actuated by animal or steam power, and applicable to agricultural or engineering purposes. The patentee says, “The principal part of my invention is that which performs the part of the plough-share by digging or lifting the soil, and consists of a number of wheels or cylinders placed on an axle, each cylinder being furnished at equal distances round its circumference with curved pick-shaped prongs; the peculiarity of the curve in relation to the size of the wheel on which they are placed having this characteristic, that each point where it comes in contact with the ground represents a segment of the curve which a point on the periphery of the wheel would describe at each revolution while travelling over the ground; in consequence of which, the pick-shaped digging points receive the direct pressure of the wheel throughout their length; and, as the wheel passes over, the position of the picks in relation to the surface becomes gradually reversed, so that they rise out of the ground at right angles to the line at which they entered, lifting the soil with them.” The machine is supported by two wheels, which run on separate short axles. Between these wheels there is an adjustable lever frame, carrying an axle on which the digging wheels are placed so as to turn independently of each other. As the machine advances, the picks or prongs successively penetrate and break up the land,—the earth falling from them on to angular mould boards behind, by which it is turned over. When grass lands or tenacious soils are to be operated upon, circular revolving coulters or cutters precede the digging wheels, or the circular coulters may be placed on the same axle, and fixed either to the rims of the digging wheels or against the sides of the picks or prongs.

[Printed, 6½d.]



A.D. 1853, June 9.—N° 1409.

ARNOUX, CLAUDE.—“The invention consists in the mode of  
“employing ropes or chains and pullies for towing boats, the  
“traction of locomotives or railway carriages on railways, for  
“working ploughs, and other similar purposes.

“When applied to driving boats on canals or rivers, the cord  
“or chain is set down the whole length of the distance to be  
“travelled over, and is suitably fastened at its extremities in the  
“bed of the river, or on one side of the navigable way at the bow.  
“The pullies are placed on a vessel preceding those to be towed,  
“and on this vessel a steam engine is set up, which serves to give  
“motion to the said pullies; and the pullies moving in an  
“opposite direction to that the boat is intended to follow, will  
“cause it to go forward. The grooves of the pullies are of the  
“same form as the links of the chain or the torsions of a rope,  
“and will hold the rope or chain tightly, so as to prevent its  
“slipping.

“The same contrivance may be applied to railroads for enabling  
“the locomotive and carriages to surmount risings. It may also  
“be applied for working ploughs when steam power is employed,  
“and procures the advantages of a fixed point, which renders the  
“action of the plough more perfect.”

[Printed, 2½d.]

A.D. 1853, June 13.—N° 1426.

O'CONNOR, HUGH.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The title of the invention is “Digging the soil by machinery with  
“horse power;” but as the machine represented in the drawing  
appended to the Provisional Specification is equally suitable for  
being drawn by steam power, it is deemed proper to include it  
amongst the other digging machines of this series of Abridgments.  
The machine is carried by a pair of large wheels and a single small  
leading wheel. From the axle of the large wheels, motion is  
communicated by cog-wheels to a horizontal crank shaft, formed  
with four cranks; and these cranks are connected to the stems or  
stocks of four iron spades, “which by the revolution of the cranks  
“are alternately raised and depressed, and at the same time

“ receive a lifting motion by being passed thro’ grooves at the  
 “ end of the framing.”

[Printed, 7½d.]

A.D. 1853, July 15.—N° 1697.

NEWTON, WILLIAM EDWARD (*a communication*).—“ The  
 “ machine or apparatus which forms the subject of the present  
 “ invention, although applicable for digging, excavating, and  
 “ removing earth for various purposes, is intended more particu-  
 “ larly for digging or cutting ditches or drains, and removing the  
 “ earth therefrom. The machine consists principally of a rotating  
 “ wheel, to which a number of shovels are attached. This wheel  
 “ is mounted in a frame; and the hinder part of the wheel is  
 “ enclosed in a box or chamber. To the lower part of this cham-  
 “ ber, or to some convenient part of the framework, a share and  
 “ mould board are fixed; and as the machine is propelled or drawn  
 “ forward, the share cuts away or loosens the earth for a subse-  
 “ quent operation, when the rotating shovels will raise the loose  
 “ earth and throw it on to wing pieces, which are attached to the  
 “ sides of the apparatus.” From these wing pieces the earth may  
 fall into a cart, barrow, or other receptacle, or on to the ground  
 alongside of the ditch or drain. A shaft, armed with spikes or  
 teeth, is mounted at the upper part of the framing, for the purpose  
 of clearing the shovels or scoops from any earth which may adhere  
 to them. “ The apparatus is to be drawn forward by horses, and  
 “ the onward progress thereof causes the wheel with the shovels  
 “ attached thereto to rotate and scoop up the earth that has been  
 “ loosened by a previous operation.”

This machine is noticed because, in a modified form, it may be  
 actuated by steam power, and employed for digging or breaking  
 up land.

[Printed, 2½d. See also No. 342 (1853).]

A.D. 1853, August 3.—N° 1810.

ATKINS, THOMAS.—*This invention received Provisional Protec-  
 tion, but notice to proceed with the application for Letters Patent  
 was not given within the time prescribed by the Act. It is thus  
 described by the patentee:—“ The transmission of power, whether  
 “ derived from water, wind, steam, heated air, or other source for*



“ communicating motion to agricultural implements, is this :—I  
 “ surround a grooved wheel, which will be in connection with the  
 “ prime mover, with a rope or cord, whether of metal, hemp, or  
 “ other elastic material, termed an endless cord, and secure such  
 “ rope or cord at a proper tension, to enable me to transmit power.  
 “ I attach the same at the requisite distance to a frame, termed by  
 “ me a rope-cart or carrier; such rope-cart being provided with  
 “ pullies, wheels, and mechanism to secure a steady strain for  
 “ keeping the rope at a proper tension to enable me to transmit  
 “ or communicate power to a carriage, which I term a ‘commu-  
 “ nicator,’ either to work horizontally or perpendicularly. This is  
 “ a method of communicating power from a stationary or loco-  
 “ motive prime mover, or both, to locomotive implements for cul-  
 “ tivating, sowing, reaping, mowing, dressing, ploughing, or other  
 “ work required in agricultural business.

“ Attached, as circumstances may require, I use a cylinder of any  
 “ required diameter, with one or more smaller ones attached as  
 “ may be requisite; such cylinders to be set or studded with  
 “ spades, knives, or prongs, or such other teeth or implements as  
 “ the circumstances of the case may require.”

[Printed, 2½d.]

A.D. 1853, August 6.—N<sup>o</sup> 1842.

SOUTHAN, HENRY.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* “Improve-  
 “ ments in ploughs,” which are thus described by the inventor:—  
 “ My improvements consist in forming that portion of a plough  
 “ known as the ‘sock’ or share (and which is situated immediately  
 “ in front of the ‘mould board’) in the form of a screw, having  
 “ any sufficient number of blades or ‘worms;’ which blades may  
 “ be of any desirable pitch to suit the soil through which they are  
 “ to work. In some cases I may make the blades of such a size  
 “ and pitch that a mould board will be unnecessary, as in the  
 “ progress of the screw the blades will sufficiently throw over the  
 “ soil. I also form that part termed the ‘beam’ more curved  
 “ than in ordinary ploughs. This plough may be driven by either  
 “ steam or horse power.”

[Printed, 2½d.]



A.D. 1853, August 13.—N° 1899.

HOSKYNS, CHANDOS WREN.—“This invention consists of a machine for the cultivation of the soil, more especially clay soils, by steam power, applied in such manner as to accomplish at one process the due preparation of the soil for a seed bed. This result is obtained by a machine which, instead of lifting in mass the stratum of earth under cultivation, like the plough or spade, is so applied to the soil as to reduce it by abrasion to the required tilth or fineness. This abrasion is performed by a series of discs or wheels, fixed on a rotating axis actuated by steam power,—the periphery of which discs are furnished with radiating points or cutters. The rotatory motion of the discs is communicated from the steam engine, from which also the progressive motion of the machine is derived. The two motions are independant of each other, and so arranged that a rapid motion may be given to the cutters while the progressive motion is slow or suspended altogether, as at commencing. The gearing is such that the respective speeds can be varied at pleasure to suit the nature of the soil. The cutters by their rotary action first enter the soil, making a semicircular trench, which during the progress of the machine is constantly preserved at the required depth; and the soil, abraded and cut down as the machine advances, is thrown off tangentially behind, and deposited in a comminuted, inverted, and aerated condition.” The machine is mounted on two pairs of very broad wheels or rollers,—the driving wheels or rollers being made with ribs across the periphery, to ensure a sufficient bite or hold upon the ground.

[Printed, 8½d.]

A.D. 1853, August 25.—N° 1980.

BROOMAN, RICHARD ARCHIBALD (*a communication*).—*This invention did not proceed to the Great Seal.* “Machinery for digging, breaking, and trenching land.” The drawing attached to the Provisional Specification represents a digging machine fitted with endless chains, working around chain wheels on two horizontal shafts, and carrying transverse ribs, so as to form “a moveable platform for men, horses, oxen, &c., to walk upon for the purpose of working the machine;” but it is also stated that the machinery may be worked by steam power. Motion is transmitted



from the moving platform or steam-engine to a horizontal shaft on the top of a cast-iron frame at the back of the machine. This shaft is furnished with several excentrics or cranks, connected by rods to the hind ends of a like number of straight levers, which turn at their foremost ends upon a horizontal axis beneath the cast iron frame; and the hind ends of the levers are also united by links to short cross pieces, carrying the digging forks or spades. From each cross piece an arm projects backward and is connected by a rod to the lower end of a long curved lever, which turns near its upper end upon a horizontal axis at the front of the cast iron frame; and at the top the several curved levers are united to sliding pieces, actuated by cams on the shaft that carries the excentrics. The vibratory movement thus imparted to the curved levers causes the cross pieces with the forks or spades to turn on the pins which connect them with the links before mentioned; the excentric rods alternately depress and raise the forks or spades; and the straight levers give them a backward motion as they descend in the earth. A horizontal shaft, with prongs projecting from it, revolves at the rear end of the machine in such a position that its prongs will pass between the prongs of the forks or spades as they ascend, and, taking the earth therefrom, will carry it over the shaft and deposit it again upon the land.

The motions of the forks or spades are thus explained:—"They will, 1st, be thrust down into the ground, either in a perpendicular or in a somewhat oblique position; 2nd, while down, and before being lifted up, they will be turned into a horizontal position, thereby breaking up the soil before them; 3rd, while in this horizontal position, the forks or spades will be lifted up, keeping the earth at the top of them until it is removed by the revolving prongs 3, 3; and 4th, the forks or spades, when unloaded, will again be turned into their first position, ready for again entering the ground." It is stated that when the ground is too loose for forks, close spades are to be used.

For breaking up stiff and hard soils, a shaft, provided with prongs, is substituted for the forks or spades; and as the shaft revolves, an up-and-down motion is imparted to it by means of the excentric rods.

When the machine is to be employed in cutting trenches for draining land, an endless chain of scoops or buckets is substituted for the forks or spades.

[Printed, 5½d.]

A.D. 1853, September 15.—N° 2147.

JEANNERET, HENRY.—Machinery actuated by animal or steam power for digging and tilling land by means of tines, spades, or cutting blades, fixed on horizontal axes between two discs with sharp wedge-like edges, plain or serrated, for penetrating the earth. These discs are connected together by an axle and by eight bars placed in the form of a square around the axle. The four bars at the angles of the square play freely in holes in the discs, so that they can turn with the tines, spades, or cutting blades, which are affixed to them. The four intermediate bars in the middle of the sides of the square serve as stops to the ends of the arms that carry the spades or cutters. The axle projects beyond the discs, and is furnished with two rollers, to travel on the surface of the land and determine the depth to which the discs and tines, spades, or cutters shall penetrate. Two small rollers, mounted on the framing of the machine, work in circular grooves formed on the outer sides of the discs, so as to draw the apparatus onward and cause the discs to revolve and carry round the tines, spades, or cutting blades. Each cutting blade "falls diagonally upon the spot where it is to enter the ground, and is gradually forced down until it becomes vertical." The intermediate bar or stop is then in contact with the outer ends of the arms, and holds the blade firmly to its work as it rises with the clod or portion of earth which it has severed. The larger part of the clod passes through the space between the blade and its bar or axle, and becomes reversed; while the remainder or lower part is brought uppermost and delivered nearly in the same place, but reversed.

[Printed, 6½d.]

A.D. 1853, October 19.—N° 2418.

DUSSUC, ALEXIS.—Machine for digging and cultivating land by steam power, consisting of a locomotive engine with two pairs of steam cylinders, connected with the cranked axles of two driving wheels, which are made to revolve independently of each other, so as to allow of the machine being turned in any direction. Motion is transmitted from the driving axles, by toothed wheels, to the digging or "ploughing apparatus," which consists of a number of pointed shovel blades, attached by arms or shanks to a cylindrical framework. This framework is fixed on a horizontal



shaft behind the driving wheels, and the arms or shanks project radially therefrom, carrying at their outer ends the shovel blades, which stand nearly at right angles to the shanks; so that when the shaft is made to rotate, the shovel blades will successively enter and break up the soil. "Immediately behind the plough is a fol-  
" lower or iron plate, for levelling the surface of the earth prepar-  
" tory to sowing the seed. The apparatus for sowing the seed  
" consists of an ordinary drill, carried upon a moveable frame,  
" capable of being raised or lowered when required. At the end  
" of the carriage frame of the machine there is a box or chamber  
" for containing manure, the distribution of which is regulated by  
" a perforated cylinder attached to the moveable framework carry-  
" ing the drill. Following the manure distributor is an iron roller  
" which covers in the seed and manure and smooths the surface of  
" the furrow."

[Printed, 5½d.]

A.D. 1853, November 1.—N° 2530.

BAUER, JOSEPH.—Steam digging and harrowing machine, consisting of a frame, supported by four wheels, and carrying a steam-engine and boiler, together with the spades, harrow, and apparatus for giving motion thereto. "Two levers are used, placed parallel  
" to each other, and in a direction from the back to the front of  
" the carriage, and they move on their respective axes. The fore  
" ends of these levers are connected to sectors of pulleys, placed  
" above them, by ropes, chains, or straps; and, by suitable gearing  
" from the main axle, these levers are moved to a horizontal  
" position by winding up the ropes, chains, or straps. The fore  
" ends of the levers are connected by a shaft (across the frame);  
" and several spades, each provided with a stout handle, are con-  
" nected to the shaft. Over and across the frame, and just above  
" the digging levers, is the main axis, which receives motion from  
" the steam-engine. By means of eccentrics the digging levers  
" are pressed towards the surface of the ground, and with them  
" the spades, which are forced into the soil; and by other  
" excentrics, acting on the handles of the spades, the shaft to  
" which they are attached is made to move partly round, by which  
" the spades are raised, together with the earth they have pene-  
" trated, and the earth is thrown off by the impulse with which  
" the spades are raised. The digging levers are then moved back



“ to their horizontal position, and the carriage is moved a distance. “ Two shafts under the machine connect the digging machinery “ with a harrow, hanging on a separate axle at the hinder part of “ the carriage; and motion is communicated from the digging “ levers to this harrow, giving it a depressing and also a to-and-fro “ movement, so as to pass the teeth through the dug earth.” The spades move simultaneously, and act as one spade; but in lieu of several narrow spades placed edge to edge, a single broad blade or spade may be employed. The four wheels which carry the machine consist of two large hind wheels with broad smooth tires, placed outside the framing, and two small fore wheels, situated beneath the framing, and acting as the driving or pulling wheels. With regard to the latter, the patentee remarks, “ Their tires are not “ even, but concave for the third part of their breadth in their “ middle: this is in order to prevent their sinking too much into “ the ground, as also to retain the wheels in a straight direction “ and to prevent their sliding sideways.”

[Printed, 2s. 8½d.]

A.D. 1853, November 29.—N<sup>o</sup> 2775.

KELLY, PATRICK.—The patentee says, “ My invention of ‘ an “ ‘ improved apparatus for cultivating, preparing, and treating “ ‘ land, and for sowing seeds,’ is intended to provide the means “ of ploughing or opening, breaking up, and pulverizing the “ ground, of depositing the seed, and rolling it into the ground “ with increased facility; and consists in the combination with a “ locomotive of an apparatus or implement for pulverizing the “ land, a drill or apparatus for sowing seed, and a roller for rolling “ in the seed,—all such parts being combined with suitable driving “ and adjusting gear. The locomotive may be of the ordinary “ construction (as its particular construction does not form part of “ my invention); but in the hinder part of the frame is mounted “ an iron cylinder, set round with teeth or spikes, which by means “ of suitable toothed gear may be made to revolve at a considerably “ greater speed than the driving wheels of the locomotive, and “ produce a corresponding effect upon the ground.”

“ Behind this implement or apparatus is fixed a kind of splash “ or mould board; and behind this a drill or apparatus for sowing “ seed, supplied with a hopper, and driven by means of a broad “ wheel or drum, running on the ground, and carrying on its axle



“ a pulley or drum, round which a band passes, communicating  
“ with another pulley or drum in connection with the sowing  
“ apparatus ; or it may be otherwise driven.”

To the back of the machine is connected a roller, for rolling in the seeds deposited by the drill. But this roller and the drill may sometimes be dispensed with.

[Printed, 9½d.]

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## 1854.

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A.D. 1854, January 7.—Nº 41.

JOHNSON, JOHN HENRY (*a communication from Robert Romaine*).—*Void by reason of the patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* This invention relates principally to the machinery for effecting agricultural operations, described in the Specification of Letters Patent, No. 1151, May 10, 1853. In the present instance, an improved vertical tubular boiler is fitted in the cart body. A rotary engine of peculiar construction is substituted for the reciprocating engine previously used for actuating the mechanism attached to the cart; which rotary engine may be also employed for driving other machinery. “ On the shaft of the engine is fitted  
“ a bevil-wheel, gearing with a corresponding wheel on a trans-  
“ verse shaft, which runs through the centres of the axes of the  
“ running or carrying wheels of the cart; such axes being made  
“ tubular, and fixed to the sides of the cart.” Motion is transmitted from the ends of the transverse shaft by suitable gearing to the cultivating mechanism or reaping apparatus.

[Printed 3d. See also No. 1151 (1853).]

A.D. 1854, January 16.—Nº 97.

CROSSKILL, WILLIAM.—*Void by reason of the patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* “ Improvements in construction of portable  
“ railways,” suitable for agricultural purposes. The invention



consists, "first, in making a railway of bridge rails, longitudinal sleepers, and cross pieces, bolted or framed together in lengths or parts, so that each length is portable; and, secondly, in the manner of fastening together the ends of each length by sockets and bolts, so that when put together they form one continuous line, and can be laid down so as to be diverged when required from a straight line, and with sufficient flexibility to admit of their being laid up and down hilly or undulating ground."

[Printed, 6d.]

A.D. 1854, February 2.—N<sup>o</sup> 260.

ATKINS, THOMAS.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* "Improvements in transmitting power and communicating motion to implements for agricultural and other purposes," which are described by the inventor in the following manner:—"The power I propose to transmit by means of my invention may be obtained from water, wind, steam, heated air, or any combination of these or any other agent; and which prime mover may be stationary or locomotive. In connexion with the prime mover I propose to attach a grooved wheel, which will be surrounded with an endless rope or cord, whether made of metal, hemp, cotton, or any other elastic material. I attach this rope or cord at the required distance to a frame, named by me a rope cart or carrier; such being provided with pulleys, wheels, and other mechanism, to secure a steady strain for transmitting power and communicating motion to a carriage, which I call a 'communicator;' and attached to the 'communicator' I use a cylinder of any required diameter, with one or more smaller cylinders, as may be required,—such cylinders to be set or studded with spades, prongs, knives, teeth, or such other implements as the work to be done may require."

[Printed, 3d. See also No. 1810 (1853).]

A.D. 1854, February 22.—N<sup>o</sup> 431.

BOYDELL, JAMES.—Relates to the invention protected by Letters Patent No. 11,357, August 29, 1846, "which consisted in the application of moveable detached parts of a railway to the wheels of carriages, whereby each part is successively placed



“ by its wheel on to the road or land over which the carriage  
 “ travelled; each part of the portable railway, when down,  
 “ allowing its wheel to roll over it; the wheel depositing and  
 “ lifting the parts of the railway in succession.” In the present  
 instance, “ the parts of the rails on which the wheels of a carriage  
 “ run are each fixed to a plate, by preference of wood strength-  
 “ ened with iron, so that the surface-bearing of the plate is  
 “ considerable, as compared with the width of the tyre of the  
 “ wheel,—the plate extending considerably on either side of the  
 “ rail on which the wheels run. The ends of the bearing-plates  
 “ are formed so as to match into each other, and in each case to  
 “ extend beyond the end of the portion of rail which a bearing-  
 “ plate carries; so that when a carriage wheel comes to the end of  
 “ one portion of rail, it does not come to the end of the bearing-  
 “ plate on which that part of the rail is fixed, but is received on  
 “ to, and is supported by, the next portion of rail, before the  
 “ wheel has passed beyond the end of the previous bearing-plate.”  
 “ For lightness, with strength and stiffness, it is preferred to use  
 “ light trough rails of iron, fitted with wood, and fixed by rivets  
 “ or otherwise to the bearing-plate.” To the middle of each  
 bearing-plate is fastened a piece of metal, similar to a **V** inverted  
 (thus **A**), termed by the patentee a “triangle,” and serving to  
 connect the plate to the wheel. The triangle passes between two  
 guide-plates, fixed to the side of the wheel; and it is prevented  
 from withdrawing therefrom by a stud at its apex. This stud,  
 when its bearing-plate is about to be laid upon the ground, enters  
 a notch at the foremost end of one of the guide-plates, and serves,  
 in conjunction with a stop (affixed to the wheel), to lay the plate  
 in a correct position,—the stop projecting radially beyond the  
 periphery of the wheel, and the end of the bearing-plate coming  
 in contact therewith.

[Printed, 9d. See also No. 11,357.]

A.D. 1854, May 12.—N<sup>o</sup> 1063.

WESTLEY, WILLIAM KING.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* “An improved construction of railway and carriages to be employed thereon, applicable chiefly to farm purposes.” The inventor says:—“The chief object of this invention is to produce a cheap



“ temporary railway, over which light carriages, suitable for carrying farm and other produce, might be run. The railway I propose to support upon a row of pillars, on opposite sides of which the carriages are intended to run. These pillars project through, and serve to carry a line of wood planking, to the sides of which iron rails are affixed. Upon these rails, which form a double way, run the wheels of the carriages; and for a further support to the carriages, and to keep them perpendicular, the pillars carry, at their upper ends, a similar arrangement of rails, against the inner face of which anti-friction rollers, mounted on the top of the carriages, bear.” “The supporting pillars may sometimes be mounted on moveable wheel carriages, or on floating boats or pontoons.

“ The carriages admit of great variety of form, and may be furnished with four wheels to run on the ground as well as the railway; and the wheels may be supplied with swivels to enable them to move in curves. Their main weight may be borne by either rail on one or more wheels. They may be moved on the railway by simple traction, with a rope pulled by man or beast, or by an endless rope or chain, supported on pulleys, and worked at one end of the line by any convenient power, wind, water, animal, or steam.”

[Printed, 3d.]

A.D. 1854, June 13.—N<sup>o</sup> 1293.

SOUTHALL, WILLIAM. — *This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* Machinery for cultivating and pulverizing land. The framework of the machine is supported by two pairs of running wheels. “The instrument employed in loosening and breaking up the land consists of a screw or cutter, which may be of a gradually increasing pitch and diameter, the point, or that part which enters the land first, being of a very small diameter, whilst the other end of the screw may be of sufficient diameter to be just above the surface. Immediately behind the blade of the screw, and fitted into the same spindle, are a series of radiating pins or arms, which may be arranged also, if found desirable, in a spiral or helical form. These pins or arms act as pulverisers upon the soil, already loosened and turned up by the action of the screw



“ or cutter; and consequently the machine leaves the land perfectly loosened and pulverised at one operation. A rotatory motion is communicated to the screw or cutter by means of a suitable bevel and spur gearing, in connection with the axis of the hind pair of running wheels, from which the motion of the screw is derived. The machine may be worked by horse or other power, and may be fitted with one or more screws or cutters, arranged in the manner herein-before described.”

“ Although the screw or cutter is mentioned as entering the soil at an angle, yet it is proposed in some cases to work it horizontally, the main feature of the invention being the application and use of revolving cutters of any kind, such cutters revolving in a direction at right angles with the movement of the machine, in place of in the same direction, as has hitherto been effected in instruments of this class.”

[Printed, 3d.]

A.D. 1854, June 17.—N<sup>o</sup> 1325.

WILLIAMS, JOHN ALLIN.—Improved machinery for ploughing and cultivating land. The ploughs are contained in a rectangular framework, supported by a pair of large fore-wheels (which can be adjusted to different heights) and by a single small hind wheel in a swivel frame; and at the front of the framework there is a transverse bar to receive the shafts or hauling gear for horse or steam power. Each plough is affixed to a separate beam, which extends the whole length of the framework, and is provided with suitable apparatus whereby it can be raised out of work and lowered again independently of the other beams. The rear end of the beam is slotted, to work on an upright guide bar; and the front end is jointed to a block, which is capable of sliding on a similar guide bar. The joint permits the beam to rise or fall in the rear on the plough meeting with any obstruction or great irregularity in the ground, and it also enables the attendant to raise or depress the plough by means of a short handle at the rear end of the beam. When desired, the front guide bars can be inclined laterally, “consequently giving a corresponding lateral inclination to the coulter and ‘turn furrows’ of the ploughs, which will enable them to turn the furrows more efficiently when ploughing a hill-side or sidelong ground.” The ploughs are fixed to their beams in such positions that they stand one behind the other across the



frame, so that the off or right hand plough begins to cut first, and the others follow in regular succession.

As a modification of the above arrangement, it is proposed to employ four ploughs fitted into one frame, two of the ploughs turning the furrow to the right and the other two turning it to the left,—one set being raised out of the ground while the other set is in action. “This arrangement will not involve the necessity of having a longer frame than will be requisite for a machine with two ploughs, as the ploughs in the two sets of beams or bars will be opposite each other, although in each set one plough will be placed a short distance behind the other. A short machine containing two right-hand ploughs may also be fitted with two left-hand beams or bars carrying pairing shares, so that the two operations of paring and ploughing may be effected at one and the same time, by means of the ploughs passing over in the second traverse the ground previously pared in the first traverse by the paring shares in the left-hand beam.”

When the machine is not required for use in ploughing, it may be converted into a scarifier or cultivator, by substituting drags or paring shares for the ploughs; or the beams may be fitted with land pressers or clod-crushing discs.

[Printed, 1s. 6d.]

A.D. 1854, July 6.—N<sup>o</sup> 1487.

JOHNSON, JOHN HENRY (*a communication from Robert Romaine*).—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* It relates generally to the machinery for effecting agricultural operations which formed the subject of Letters Patent No. 1151, May 10, 1853. “As arranged for digging or working land, the improved agricultural machine consists of an open framework of wood and metal, running upon a pair of large loose wheels, set in front of the actual digging details, and capable of being drawn by horses with shafts or traction gear in the usual manner. The framework is extended downwards to carry the transverse shaft of the digging or working cylinder; behind which shaft, at the extreme hind end of the machine, is a bearing or supporting roller, for relieving the frame of a portion of its dead weight. The transverse digging shaft has keyed upon it a metal cylinder, on



“ which are bolted a set of [radial] arms for carrying the digging bars or knives.” These bars or knives extend from end to end of the digging cylinder, and the edges, “ which are either plain or serrated, are set so that on the revolution of the cylinder they are the most favourably disposed for entering the earth; and they are either made to run parallel with the digging axle, or are set spirally or inclined thereto; or these bars may be formed in double angular lengths, so as to present points and inclined surfaces to the earth during working.” The digger is actuated by a pair of horizontal steam cylinders, set one on each side of the frame, the connecting rods of the two cylinders being respectively joined to cranks fixed on the upper ends of two vertical spindles, which are connected by gearing with the digger shaft. From these spindles motion is also communicated to a transverse shaft, placed just behind the main carrying wheels of the machine. “ This transverse shaft has upon it a pair of metal pullies, formed with india-rubber or other elastic surfaces, each of which surfaces is opposed to the broad periphery of one of the main carrying wheels; with this arrangement, as the digging goes on, the digging bars are kept well fed up to their work by the propelling action given to the main carrying wheels from the engine shafts through the elastic drums.” The machine is furnished with a seed box, and also with a levelling board behind the digger for levelling the soil.

An improved vertical tubular steam boiler is described.

[Printed, 3d. See also Nos. 1151 (1853) and 41 (1854).]

A.D. 1854, July 24.—N° 1626.

COLE, BEAUMONT.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* “ This invention has reference to a kind of rotary plough or grubber: that is, a ploughing or grubbing instrument, such, for instance, as a body, mould board, land side rist, share, coulter, &c., or any given number of these, is or are to be fixed, fastened, or attached to or upon a revolving shaft or spindle of such shape or construction as shall turn over the soil or earth in furrows (which furrows will be cut in pieces), like as the present ploughs turn the top soil to the bottom and the bottom soil to the top. If more than one ploughing instrument, &c., is or are fixed

“ upon the same shaft or spindle, it or they may be made to  
 “ revolve in the same line, similar to a wheel either of a cart or  
 “ railroad carriage, and may be made to plough either deeper or  
 “ thinner, or to stop ploughing. One or more of the said shafts  
 “ or spindles, thus equipped, is to be attached to and combined  
 “ with suitable framing, which will connect it with a suitable steam  
 “ or other power engine, which will not only work the plough, but  
 “ will cause, by the aid of the wheels or rollers, the whole to travel  
 “ over the field. To the above framing, drills, dibbles, rollers, or  
 “ other implements of tillage might be attached.”

[Printed, 3d.]

A.D. 1854, August 29.—N<sup>o</sup> 1886.

HANCOCK, JAMES LAMB.—“ This invention consists of dividing  
 “ the operation of making drains and laying down tiles, which  
 “ has heretofore been done at one operation, namely, at the same  
 “ time that the plough is travelling or in action, into a series or  
 “ number of operations.” For this purpose, the patentee connects  
 a wire rope with the coulter of a plough similar to a common mole  
 plough. “ When the plough is drawn along the course of the  
 “ drain by horse, or steam, or other power, the said wire rope will  
 “ thereby be laid in the line of the intended drain at its required  
 “ depth from the surface.” The plough having been removed,  
 “ a ‘mole’ or ‘cone’ of the diameter of the required drain is now  
 “ hooked at either end of the said wire rope, and to the other end  
 “ of the said ‘mole’ or cone a rope is attached, by a hook or  
 “ other means, on which the tiles are threaded. Power is then  
 “ applied to the loose end of the wire rope, and the ‘mole’ and  
 “ rope on which the tiles are threaded are drawn into the drain  
 “ together.” In place of employing only one mole, the patentee  
 prefers to use a number or series of moles or cones, gradually  
 increasing in size, one after the other. In some cases, a wedge-  
 shaped trench or furrow is cut, to facilitate the operation of making  
 deep drains.

[Printed, 7d.]

A.D. 1854, October 10.—N<sup>o</sup> 2162.

CROSSKILL, WILLIAM.—“ Improvements in the construction  
 “ of portable railways,” suitable for agricultural purposes. The  
 railway is made in frames or lengths, each composed of two longi-



tudinal sleepers, having rails fixed thereon, and connected by pins to two transverse sleepers in such manner as to admit of the frame being folded, or the two longitudinal sleepers brought near to each other, to facilitate the removal of the railway to another place. When in use, the ends of the longitudinal sleepers and rails of one frame are connected to those of the next frame by means of loose transverse sleepers, having loops or chairs fixed upon them to receive those ends, which are secured therein by pins or bolts. The longitudinal sleeper and rail on one side of the frame are made longer than those on the opposite side. When the long and short lengths are laid down alternately on each side, the railway is perfectly straight; but when most or all of the long sleepers and rails are laid on one side, the railway is curved. The rails are made of suitable forms "for enabling vehicles with flanged or flat-tired wheels of various different guages to travel upon the same railway."

[Printed, 1s. See also No. 97 (1854).]

A.D. 1854, October 13.—N° 2188.

HANCOCK, JAMES LAMB.—*This invention did not proceed to the Great Seal.* "An improved machine for ploughing or working land," which is thus described by the inventor in the Provisional Specification:—"This invention consists of fixing knives to a metal plate, which is placed edgewise. The said knife or knives are fixed so as to cut the land, as it were, into slices laterally on both sides of the plate, and to act one after and below the other, —the first knife or knives to cut the land near to the surface, the second to cut below the first, and the third to cut below the second. In some cases I use a share on the front of the plate. The said plate must be fixed to a suitable frame or 'beam;' and to the said frame or beam I fix one or more wheels, as in the case of the common plough. I do not confine myself to any particular shaped knife, nor to any particular number of knives, but I do claim for so arranging knives one below the other, or after and below the other, in such a way as to cut, slice, or divide the land laterally into fragments. I do not confine myself to any particular kind of power for working or drawing my said 'improved machine for ploughing or working land.'"

[Printed, 3d.]

A.D. 1854, October 30.—N° 2302.

MAGGS, OLIVER.—“Improvements in portable steam-engines.” This invention relates solely to the construction of portable or agricultural steam-engines. No reference is made to the application of such engines to the working of agricultural implements.

[Printed, 2s.]

A.D. 1854, December 4.—N° 2550.

BENTALL, EDWARD HAMMOND.—“An improved construction of locomotive steam-engine.” “The object of this invention is to simplify the construction of that class of locomotive steam-engines known as agricultural steam-engines, and to render their action more efficient than heretofore, by lessening their vibration when in operation.” The patentee does not point out any method of employing his improved engine for actuating field implements.

[Printed, 9d.]

A.D. 1854, December 20.—N° 2679.

BITTLESTON, WILLIAM.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* “The object of this invention is to facilitate and to cause the plough to glide or slip through the land or soil when it is being used for ploughing. To accomplish this I lubricate or anti-attributate the implement, and so diminish the drag or friction of it with the soil, on the same principle as metals, woods, and other substances with lubricating substances have their friction reduced; and by similar means applied to the plough, I believe to accomplish a considerable saving of steam, horse, or other power consumed in dragging the plough through the ground, and particularly when several ploughs are to be used together. To effect this I have apertures of suitable shapes or forms, as circumstances may require, in the plough, protected from external obstructions from the soil by flaps or valves, fixed in a suitable manner, and connected with a supplying or feeding apparatus by the means of channels, pipes, reservoirs, pumps, forcing-pumps, columns of pressure, or elastic pressure, or by



“ all or by any of these means, as may be found necessary for conveying the lubricating or anti-attribitional matters to the surfaces of friction of the implements; and these anti-frictional matters may be water, liquid manure, or soapy water, soap softened a little with water, or in some cases farinaceous, mucilaginous, gelatinous, or oleaginous, or any or all of these, as may best suit the nature of the soil and circumstances.”

[Printed, 3d.]

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1855.

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A.D. 1855, January 6.—N<sup>o</sup> 35.

JOHNSON, JOHN HENRY (*a communication from Robert Romaine*).—This invention relates generally to the machinery for effecting agricultural operations which formed the subject of Letters Patent, No. 1151, May 10, 1853. “ As arranged under one modification for digging or working land, the improved agricultural machine consists of an open framework of wood or metal, running upon a pair of large loose wheels, set in front of the actual digging details, and capable of being drawn by horses with a pole or shafts or traction gear in the usual manner. The framework is extended downwards to carry the transverse shaft of the digging or working cylinder; behind which shaft, at the extreme hind end of the machine, is a bearing or supporting roller, for relieving the frame of a portion of its dead weight. The transverse digging shaft has keyed upon it a metal cylinder, on which are bolted a set of [radial] arms for carrying the digging bars or knives.” These bars or knives extend from end to end of the digging cylinder, and the edges, “ which are either plain or serrated, are set so that on the revolution of the cylinder they are the most favourably disposed for entering the earth; and they are either made to run parallel with the digging axle, or are set spirally or inclined thereto; or these bars may be formed in double angular lengths, so as to present points and inclined surfaces to the earth during working.” The digger is



actuated by a pair of horizontal steam cylinders, set one on each side of the frame,—the connecting rods of the two cylinders being respectively joined to cranks, fixed on the upper ends of two vertical spindles, which are connected by gearing with the digger shaft. From these spindles motion is also communicated to a transverse shaft, placed just behind the main carrying wheels of the machine. “ This transverse shaft has upon it a pair of metal “ pulleys, formed with india-rubber or other elastic surfaces, each “ of which surfaces is opposed to the broad periphery of one of “ the main carrying wheels. With this arrangement, as the “ digging goes on, the digging bars are kept well fed up to their “ work by the propelling action given to the main carrying wheels “ from the engine shafts through the elastic drums.” The machine is furnished with a seed-box, and also with a levelling-board behind the digger for levelling the soil.

A modification of the machine is described. Two oscillating steam cylinders are mounted in the centre of the frame at the front end of the machine. The piston rods extend to the opposite sides of the framework, and are connected to cranks on two horizontal side shafts. These shafts are connected with the shaft of the digging cylinder, and also with a horizontal transverse shaft, which is placed just behind the main carrying wheels of the machine, and serves to communicate motion thereto. “ In place of using frictional rollers or pulleys for that purpose, two rollers L are “ employed, having a number of studs, pins, or teeth on their “ peripheries, which take into corresponding holes or recesses “ formed in the peripheries of the main supporting wheels.”

An improved vertical tubular steam-boiler is described.

[Printed, 1s. 1d. See also Nos. 1151 (1853), 41 (1854), and 1487 (1854).]

A.D. 1855. - - - - N° 35\*.

ROMAINE, ROBERT.—Memorandum of Alteration to the Specification of Letters Patent, No. 35 (1855). Filed in the Great Seal Patent Office, July 9, 1856.

The Specification contains the description of two arrangements of machinery for digging or tilling land. In the explanation of the second machine the following sentence occurs:—“ In place of using “ frictional rollers or pulleys for that purpose, two rollers L are “ employed, having a number of studs, pins, or teeth on their “ peripheries, which take into corresponding holes or recesses



“ formed in the peripheries of the main supporting wheels.” In the Memorandum of Alteration this sentence is altered so as to read thus,—“ In place of using frictional rollers or pulleys for that purpose, two pinions L are employed, having studs or teeth on their peripheries, which work into corresponding holes or teeth formed in the peripheries of the main supporting wheels.”

[Printed, 5d.]

A.D. 1855, February 7.—N<sup>o</sup> 288.

BOUSFIELD, GEORGE TOMLINSON (*a communication from Obed Hussey*).—*This invention did not proceed to the Great Seal.* Steam ploughing machine, consisting of a locomotive or portable engine, supported at the front by a single wheel, and at the back by two wheels, which receive motion from the engine, and are connected therewith in such manner that the power may be applied to one or the other or to both. At the back of the engine there is a platform to which the ploughs are attached. “ The ploughs are designed to run parallel with each other; and to fit them for this purpose they are divested of all incumbrance which prevent ordinary ploughs working well in parallel lines of advance. The ploughs consist of a mould board and land side only; the land side is of a size sufficient only to resist the pressure of the mould board, being full at or near the coulter, and tapering to a point backwards, so that in ploughing with all the ploughs in a parallel line side by side, one plough shall turn the earth against the back side of the mould board of the adjacent plough: this arrangement is designed for light land. When the nature of the soil will not allow of this position of the ploughs, one end of the platform will be widened.

“ In place of single ploughs, two distinct ploughs may be made consisting only of the mould boards and land sides, one a right-handed and one a left-handed plough. These ploughs are fastened together at the upper edges of the two mould boards; this brings the heel of one and the point of the other in the same parallel; thus when one plough is in the ground with its point forward, the other plough is upward with its point backward. In the exact centre of the whole circumference is a gudgeon, projecting laterally on both sides. These gudgeons hang in an iron frame, which acts as a plough beam. This double plough turns by these gudgeons: first one is in the



“ ground, then the other. By this arrangement, the machine  
 “ will turn the furrows either to the right or the left.”

[Printed, 3d.]

A.D. 1855, May 8.—N<sup>o</sup> 1030.

WILLIAMS, JOHN ALLIN.—“ Improvements in machinery or  
 “ apparatus for driving or actuating ploughs and other implements  
 “ employed in working and cultivating land.” The improvements  
 consist in the employment of a hauling machine fitted with a pair  
 of windlasses or winding drums, which are driven at a slow speed  
 by an agricultural or portable steam-engine. The frame that  
 carries the winding mechanism is supported by wheels, and is  
 firmly secured to the framing of the engine. “ The ploughs or  
 “ other implements for cultivating and working the land are  
 “ attached to a small carriage, giving them an independent action  
 “ from the strain of the chain or rope, one end of which is con-  
 “ nected to the said carriage, whilst the other is wound round one  
 “ of the drums ;—the free end of the other rope or chain on the  
 “ second drum, when ploughing with one-way ploughs, being  
 “ attached to an intermediate rope, fitted with swivel hooks or  
 “ eyes ; and this rope is connected at its other end to the hauling  
 “ carriage.” “ A fixed table, secured to the side of the machine  
 “ and engine next the ploughs, contains a row of holes at distances  
 “ asunder equal to the width of furrow. In these holes is succes-  
 “ sively fixed the axis of a moveable guide pulley, round which  
 “ the hauling rope is passed, after being previously passed round  
 “ suitable fixed guide pulleys or rollers secured to the framing or  
 “ table of the machine. A moveable guide roller is fitted on to a  
 “ moveable trussel under this table, to prevent the rope from  
 “ rubbing against the edge thereof, and to guide it on to the  
 “ horizontal guide pulley. A somewhat similar table and move-  
 “ able guide rollers, forming part of a framework on travelling  
 “ wheels, with small adjustable guide pulley, is firmly fixed at the  
 “ opposite end of the field by suitable shores or struts, embedded  
 “ firmly into the ground. A large fixed horizontal guide pulley  
 “ is attached to this last-mentioned table or framework, round  
 “ which pulley is passed the intermediate rope, herein-before  
 “ referred to.  
 “ In ploughing by this machine, one or more furrows may be  
 “ ploughed at once, according to the number of ploughs employed ;



“ and the field may be ploughed either in ‘towards,’ or in what is termed ‘one-way.’ ” Each time the ploughs are drawn across the field, the moveable guide pulleys are advanced a certain number of holes in the tables, according to the number of furrows made at one time. “ On the ploughs arriving at one end or side of the field, if they are one-way ploughs, the second drum is thrown into gear and draws them back again; whilst the first drum is thrown out of gear, to allow its rope to be uncoiled by the back traverse of the hauling carriage, in readiness for the next succeeding traverse of the ploughs. To prevent the ropes from chafing against the ground, they may rest on suitable carriages or troughs running on wheels. A bell and signal apparatus is fitted on to the table or framework at the opposite end of the field from the engine; which signal serves to indicate to the engineer the precise time at which the ploughs arrive at the end of the furrow, whereupon he shuts off the steam and stops the engine, to enable the ploughs to be reversed.”

This hauling mechanism may be employed for working any agricultural implements which require to be drawn over the land, such as harrows, grubbers, scarifiers, land rollers and clod crushers, reaping and mowing machines, &c.

[Printed, 1s. 4d.]

A.D. 1855, May 24.—N<sup>o</sup> 1177.

GILGENHEIMB, THÉODOR Baron Von.—Machinery actuated by horse or steam power for digging or tilling land by spades or digging forks, which penetrate the earth in succession, and, as they rise therefrom, throw over the soil which they have separated. The spades are placed around a polygonal plate, termed the “laborator,” and revolve therewith,—their sides being nearly in the same plane with the sides of the plate during three-fourths of the revolution, and nearly at right angles thereto during the remaining fourth of the revolution. A small opening is made in the plate near the edge for the reception of the short helve or handle of each spade, which is curved, in order to pass through from one side and extend on the opposite side towards the centre of the laborator; and the helve is connected to the plate by axes or trunnions at the opening, so as to admit of the spade being moved into the position above mentioned. This movement is effected by means of a stationary “excentric wheel,” placed

parallel to the laborator, but at such a distance therefrom as to permit the inner ends of the helves to travel in the space between them, when the laborator revolves; but on each helve reaching the lowest point in the circle of rotation, it is pressed down by the excentric wheel, and its spade is consequently moved into nearly a horizontal position. The spades therefore enter the ground edgewise, or in a direction coinciding with the plane of rotation, and are then caused to turn upwards, so as to throw the earth sidewise into the furrow previously made by the machine.

For ordinary digging the machine may be furnished with several laborators, revolving side by side. "When it is intended to enter deep into the soil or to dig a trench, two 'laborators' should be placed in position one behind the other, while ploughing the same furrow. The shovels of one laborator can be placed breadthwise." In the latter arrangement, suitable means are adopted for turning the spades as they leave the ground, in order to throw over the earth which they have raised.

A cylinder armed with iron spikes may be caused to revolve either behind or at the side of each laborator, for the purpose of breaking the clods;—a "pressure plate" serving to squeeze the clods against the spiked cylinder.

[Printed, 10d. See 497 (1853).]

A.D. 1855, May 28.—N<sup>o</sup> 1222.

COLEMAN, RICHARD.—Part of this invention consists in arranging ploughs or other tilling implements in a carriage in such manner that they may be elevated or depressed independent of the elevation or depression of the carriage frame (to which the traction chain is attached), for the purpose of regulating the depth to which such implements penetrate, or withdrawing them altogether from the soil. The patentee remarks, "For this purpose, I prefer to mount two, three, or more ploughs in a position diagonal to their direction of motion, so that the one acts in advance of the other." "Each plough has a vertical stem or stems, which fit into sockets in a lower frame; which lower frame travels on wheels. These stems are free to slide vertically through the sockets, and are attached to an upper frame, which is free to move up and down, and at the same time to maintain a position parallel to the lower frame. This upper frame is suspended from the short end of a main lever, whose



“fulcrum is mounted on the lower frame; the free end of the lever projects towards the rear of the machine, or in other convenient position, where the attendant can act on it for the purpose of raising or lowering the ploughs.” “The connections between the lever and the upper frame are such as to move it and maintain its parallelism with the lower frame, assisted by links or guides to produce that effect. Instead of using an upper frame, guides may be carried up from the lower frame to keep the plough stems in an upright position, while they are controlled and supported by rods or links, by which the required motion and regulation is communicated.” Scarifiers may be substituted for the ploughs.

[Printed, 1s. 10d.]

A.D. 1855, June 12.—N<sup>o</sup> 1343.

FORD, HENRY WILLIAM.—Consists in the employment of a “self-locomotive agricultural engine” of peculiar construction, and various apparatus or implements to be adapted thereto and worked thereby; which implements may, however, be worked separately by horse power, if desired. The locomotive engine is supported by two pairs of broad running wheels, the hind pair being driven by gearing from the crank shaft of the engine, by which either a regular progressive motion can be imparted to the machine, or an intermittent onward movement, according to the operation to be performed. A frame is fixed to the hind end of the engine to carry the working implements or apparatus.

The apparatus applied to the machine when the operation of digging is to be effected consists of a frame, composed of two wheels fastened on the ends of a hollow axle, which is placed on a solid horizontal axle (carried by the hind framing of the machine), and receives an intermittent rotatory motion. Radial slots are formed in the arms of each wheel, to serve as guides to as many straight bars, which extend from one wheel to the other, and carry a series of spades or forks;—such spade bars moving to and from the axle as the digging frame rotates. The patentee says, “the operation of the diggers and its result closely resembles the operation of hand digging,—the spades or forks being pushed into the earth by a rod, which I term the treadder, actuated direct from the crank shaft; and having raised the sod, they turn it over and deposit it again face downwards. The machine

“ then makes another move forward, bringing a fresh set of spades  
“ into operation, whilst the spades or forks which have last been  
“ in the earth are cleaned by passing edgewise between fixed  
“ cleaning prongs.” The diggers may be made to turn over  
towards each other in pairs or in any other direction, and thereby  
deposit the sods or spits so as to form furrows or ridges, or to  
leave the ground in an even state. “The several sets of diggers  
“ are only pushed out of the digging frame when required to  
“ enter the ground, one half being always inside the frame,  
“ which frame is not in contact with the ground, but rotates a  
“ short distance above it. These diggers may be used for cutting  
“ drains, making excavations, and loading carts or waggons.

“A revolving harrow may be also fitted into this machine,  
“ composed of an endless chain of bars carrying prongs or spikes,  
“ which enter the ground and remove therefrom weeds or other  
“ extraneous matter, which is drawn up an inclined plane and  
“ deposited in any suitable receptacle; or a spiked roller alone may  
“ be used.”

The machine may be furnished with a “clod divider, composed  
“ of a number of revolving spikes, which bring the clods against  
“ a series of fixed spikes, prongs, or cutters, through or between  
“ which the revolving spikes rotate, thereby breaking or dividing  
“ the clods in place of squeezing them; or two spiked rollers may  
“ be used, revolving in opposite directions, and breaking the clods  
“ between them.”

Another implement to be connected to the machine is a “fur-  
“ rower, which is composed of a number of double-turn furrows  
“ or wedge-shaped implements, which furrow the ground, or  
“ turn it over on one or both sides. These furrowers are made to  
“ work either in a rotatory or rectilinear direction.

“Revolving hoes, working either vertically or horizontally, may  
“ also be employed in this machine for hoeing drilled crops and  
“ effecting hoeing generally; the hoes being made to rotate at  
“ a greater speed than the traverse of the machine over the  
“ ground.”

“A hay turner of the ordinary construction may be worked by  
“ and fitted into this machine, being driven direct from the engine  
“ by means of driving bands or other suitable arrangement.”

A hay collector may likewise be applied to the machine. “This  
“ implement is composed of a series of rakes, fitted on to  
“ vibrating vertical levers or spindles, and made to approach to



“ and recede from each other, thereby drawing the loose hay into lines or ridges.

“ Another implement consists of a hay rake, which is fitted into the machine, and serves to rake the hay together.”

A modification of the digging apparatus is described for making deep drains.

To enable the machine to ascend very steep gradients, or to pass over bad ground, a small grapnel or anchor may be fixed in the earth, and a rope conducted therefrom to a drum on the main shaft of the engine, which will wind up the rope, and thus draw the machine over the land.

In conclusion, the patentee says, “ all existing kinds of implements may be worked by my machine, if adapted to it; and the engine is designed to serve nearly all the purposes for which horse-power is at present employed.”

[Printed, 2s. 10d.]

A.D. 1855, July 6.—N<sup>o</sup> 1517.

BALK, WILLIAM.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* “ Improvements in the construction and combination of parts of portable steam-engines.” The inventor does not describe any mode of employing such engines for giving motion to agricultural implements.

[Printed, 3d.]

A.D. 1855, July 19.—N<sup>o</sup> 1629.

FISKEN, DAVID, and FISKEN, THOMAS ROBERT HAY.—This invention consists in “ apparatus for transmitting steam or other power for the tillage of land by ploughs and other implements, as well as for other purposes, such as the working of reaping and mowing machines, and machinery for cutting drains, or the hauling of manure carts, drills, rollers, harrows, &c.,” and in the machinery for applying the power so transmitted. “ The ploughs or other implements employed are supported in the extremities of forked levers, which are connected to a slotted lever by a bell crank and connecting rod, by means of which the implements are alternately raised out of or lowered into the land, so that while one set is in action, the set on the opposite side of the bell crank is out of work.” “ The power from the steam-

" engine or other prime mover is transmitted to the machine by  
 " an endless rope of a sufficient length to suit the length of the  
 " field and the distance of the motive-power engine. This rope  
 " passes under a small guide pulley or sheave [upon the ploughing  
 " machine] and over a large driving wheel, upon the axis of which  
 " are keyed two toothed pinions, in one of which a less number  
 " of teeth is cut than in the other. These pinions gear into other  
 " and similar pinions, and serve to impart motion to a spur wheel,  
 " upon the axis of which is keyed a drum, round which a strong  
 " wire rope or chain is partially wound; this wire rope or chain,  
 " after passing under two guide pulleys [carried by the ploughing  
 " machine], is fastened at each end to anchors, constructed for  
 " the purpose, and placed at opposite sides of the field or piece  
 " of land to be ploughed or otherwise operated upon. When the  
 " endless rope is set in motion, the resulting action of the drum  
 " against the wire rope or chain causes the machine with the  
 " ploughs or other implements to be drawn across the field."  
 When the machine has arrived at one side of the land, that set of  
 ploughs or other implements which has been in work is raised out  
 of the ground, the machine is shifted sidewise a distance equal to  
 the breadth of the set of implements, and the opposite set of  
 implements is lowered into the land. Then, by means of reversing  
 gear, the drum is made to revolve in the opposite direction, and  
 the machine is thus caused to travel to the other side of the field.  
 "A small flying capstan is used for taking up the slack of the  
 " endless hemp rope."

The endless rope passes in the following manner around pulleys  
 so situated that it extends along one side of the field as well as  
 from one side to the other:—From the steam-engine, which is  
 situated at one end of the field, the rope proceeds along the side  
 of the field to the flying capstan, secured at the opposite end;  
 after passing around a pulley or sheave on the capstan, it returns  
 along the side of the field until it comes to a double-grooved  
 pulley on the carriage of the anchor to which one end of the wire  
 rope is fastened; from this pulley it is conducted across the field  
 to the other anchor carriage, and, after passing around the pulley,  
 it returns across the field to the first-named anchor carriage; and  
 from the pulley of this carriage it proceeds to the steam-engine,  
 passes around a pulley or drum driven thereby, and thence again  
 to the flying capstan. When the ploughing machine is moved  
 sidewise, after each traverse, a corresponding movement is imparted



to each anchor carriage, by connecting the spindle of its double-grooved pulley (driven by the endless rope) with suitable apparatus whereby motion is communicated to a small barrel, which winds up a chain fastened to a stake firmly secured in the ground, and thus draws along the carriage. The flying capstan is moved when necessary, in order to take up the slack of the endless rope, by communicating motion from the axle of its pulley to a winch barrel, and thus causing the latter to wind up a rope, and thereby draw the capstan forward.

[Printed, 1s. 5d.]

A.D. 1855, July 30.—N<sup>o</sup> 1732.

HANSON, JOHN.—Machine for digging potatoes by horse-power, which is here noticed because a modified arrangement thereof forms the subject of Letters Patent No. 1953, August 29, 1855, in this series. "The implement consists of a light open timber frame, supported on four running wheels; the motion of the main axle being applied to the driving of an arrangement of rotatory digging forks." The wheels of the main axle are of large diameter, "and they are furnished with radial spikes on their peripheries, so as to have a firm hold upon the ground in revolving, and thus provide sufficient resistance for the fork-driving action." A horizontal shaft, driven by bevel gearing from the main axle, projects from the rear end of the frame, and carries a series of radial forks. "As the machine is traversed along, these forks revolve rapidly in a plane at right angles to the line of traverse, and, entering the drill or ridge of potatoes, scatters these out from the earth. The earth and potatoes are primarily lifted by means of a species of inclined plough plate," attached to the frame immediately in advance of the forks.

[Printed, 10d.]

A.D. 1855, August 29.—N<sup>o</sup> 1953.

HANSON, JOHN.—This invention relates to apparatus for effecting agricultural operations, more particularly the disintegration and working of the soil. The patentee says, "The machinery adopted for this purpose is mainly based upon the mechanical contrivance for which I have already obtained British Letters Patent, under the title of 'Improvements in machinery or apparatus for digging potatoes,' No. 1732, July 30, 1855; that

“ contrivance consisting of an open frame carried upon wheels,  
 “ the wheel movement being in connection with a set of rotatory  
 “ forks or diggers, arranged to rotate in a plane at right angles to  
 “ the traverse of the implement. Under the present arrangements,  
 “ however, the actual potatoe digging apparatus is replaced by  
 “ other rotating parts, capable of effecting the further operations  
 “ now contemplated. These operations are, digging the soil as a  
 “ substitute for ploughing, clod breaking, turnip and root  
 “ thinning, and hoeing.” The machine is supported by a pair of  
 small adjustable hind wheels and a central front wheel of large  
 diameter, having radial spikes on its periphery, to ensure its  
 rotation when the machine is drawn forward. From the axle of  
 this wheel motion is communicated to a horizontal shaft, which  
 projects from the rear end of the machine, and carries a series of  
 radial knives or blades. The soil is first raised by a broad plough-  
 share or ploughshares, and is then cut up and disintegrated by the  
 action of the rotating blades. Two seed boxes, with suitable  
 depositing apparatus, are fitted to the front end of the framing.

When the machine is to be used for turnip and root thinning or  
 hoeing, the rotatory blades and share or shares are removed.  
 Beneath the rear end of the framing there is a short horizontal  
 shaft, which extends lengthwise of the machine, and is driven by  
 gearing from the axle of the large front wheel. Upon this shaft  
 is fixed a pair of discs with radial arms, which carry at their outer  
 ends four straight blades or hoes, placed parallel to the shaft;  
 “ and, as each comes round during the onward traverse of the  
 “ implement in thinning, it scoops or cuts out from the ridge the  
 “ plant or plants at regular intervals asunder.”

[Printed, 1s. 1d. See also No. 1732 (1855).]

A.D. 1855, October 5.—N<sup>o</sup> 2224.

HALKETT, PETER ALEXANDER.—Applying the implements  
 required for “ ploughing, scarifying, sowing, reaping, or other  
 “ operation of culture by means of a travelling carriage, moving  
 “ on tramways or rails, or on other manufactured ways, placed in  
 “ parallel lines across the fields, whereby the said implements are  
 “ in their operation always kept at a regulated height, independent  
 “ of the small undulations or unevenness of the ground, or of the  
 “ firmness or softness of the soil, and whereby they are also kept  
 “ from varying to the right or to the left of the line of onward



"motion." Implements of various kinds, adapted to the operation required to be performed, are connected to the carriage or platform; and when necessary, in addition to the onward movement of the implements, other motions are imparted thereto from the moving power of the carriage or platform, as for instance, when Norwegian harrows, seed and manure depositors, water or liquid manure distributors, reaping apparatus, or rakes for collecting cut crops are used. The patentee says, "The platform may be caused to move over the ground by means of a stationary engine or other power, placed at the headlands, and motion communicated to the platform by means of a rope or ropes; but I prefer the engine to be placed on the travelling platform to produce its own locomotion, either by winding up ropes fixed at each end of the line, or by the friction of contact of its wheels with the rails. A rack or racks fixed to the rails to afford sufficient hold to the driving wheels, or other means may be provided to give sufficient bite to frictional contact to produce the act of propulsion." "I further lay lines of permanent way along the headlands, for the purpose of transferring the travelling platform from one line of rails to another." One of the platforms represented in the drawings attached to the Specification is supported by eight small wheels at each side; and the axles of these wheels are provided with cranks at their ends, connected together by a long rod at the side of the platform, to which a reciprocating movement is given by the steam-engine. "By thus placing the platform on a great number of wheels, the weight is distributed over the rails, thereby diminishing the pressure on any given point; and at the same time by driving the whole of the wheels, the full friction of contact caused by the weight of the platform on the rails is exerted in traction."

The ploughs carried by the platform may be placed in diagonal lines or otherwise; and they are arranged in two sets, to act alternately in opposite directions,—one set being raised out of action while the other set is in operation. When land or drill pressers, clod crushers, or other implements having a rolling motion over the ground, are applied to the platform, provision is made for elevating and depressing them; this is also the case with respect to hoes or stirrers; and when operating amongst high crops, shields are employed to separate the rows of crops in advance of the hoes, stirrers, or other implements.

The use of toothed wheels, gearing into fixed racks, for the purpose of facilitating propulsion, has been proposed by several

other inventors, as will be seen on referring to the series of Abridgments entitled "Aids to Locomotion."

[Printed, 1s. 6d.]

A.D. 1855, November 9.—N<sup>o</sup> 2521.

RAYWOOD, JOHN.—"An improved rolling, crushing, or pressing, dibbling, sowing, and harrowing machine for wheat and other agricultural and garden produce, and for general and particular purposes, the same to be worked by steam or horse-power, or by manual labour or otherwise." The frame of the machine is supported by a pair of large running wheels at the middle of its length, and is also furnished with a pair of small wheels in advance of the former. Two wheels or drums are mounted in the frame, one before and the other behind the axle of the large running wheels; and around such drums passes an endless chain of wooden or metallic links, carrying a series of dibbles. As the machine moves onward, the endless chain travels around the two drums, and the dibbles are pressed into the earth by the foremost drum and raised by the other drum: the dibbles may be so constructed as to turn in the ground, in order to make a clean hole. At the front end of the frame there is a hollow roller for depositing lime, dry ashes, sand, or other dry material, as guano, manure, &c., which is to be spread upon the land when required to prevent the dibbles clogging. Behind the second drum there is a seed-depositing apparatus; and this is followed by hoes and rakes or harrows, attached to the rear end of the frame.

The patentee says, "But I wish it to be distinctly understood that I do not confine myself to use the whole of this invention, apparatus, or improvement at one and the same time on all occasions, as in some instances and on some soils dibbling may be practicable or preferred, and pressing may be adopted with the use of seed depositor, &c." "What I claim is the right to use or adapt at any time the whole or any part of these appliances or apparatus in any way desirable or convenient, as the same may be attached to any cart, roller, harrow, carriage, dray, plough, or implement, to be used in transit or conveyance, farming operations, or otherwise; and some of the advantages which I believe to be derived are, that by the construction of the chain of links passing over one or more wheels, I form what may be termed a continuous railroad, enabling a greater weight



“ to be drawn when brought to bear upon the pressers, dibbles, &c.; by which also I am enabled to lift out the dibbles in an almost perpendicular direction.” “ And it is also intended that the working wheels of the machine shall rise and fall, in order to allow the machine to travel on an ordinary road, in its transit from place to place, without the pressers or dibbles touching the ground.”

[Printed, 7d.]

A.D. 1855, November 23.—N<sup>o</sup> 2641.

LACY, AUGUSTUS DACRE.—This invention consists, first, in a mode of constructing a trenching plough; and secondly, in a method of working such plough or other agricultural implements by steam or other motive-power. “ The plough is constructed with a strong frame of iron or other material, on which are fixed two sets of ploughshares, so arranged as that one set may be made to operate upon the ground in the forward and the other in the backward motion of the plough. These ploughshares are also formed and arranged so as to cut the ground into furrows in the form of steps, and to throw the soil over as the plough proceeds. There are also two sets of coulters fixed in the frame, adapted as to their position and depth to the ploughshares, so as to give the several vertical cuts to the ground at the depth at which the steps will be formed by the shares following in the previous line of the said coulters. The large coultter, which always precedes the other coultter, I call the tell-tale coultter, as on it must fall whatever obstruction may occur. At each end of the plough there is a mode of attachment which disconnects itself from the motive power whenever the coultter is obstructed beyond a certain extent; and the connection may be again formed by the attendant whilst remaining on the platform herein-after mentioned. The plough is fixed at the upper part of its frame to the under side of a plate, which forms a kind of platform for the attendant. To this plate may be fixed other kinds of agricultural implements in substitution for this plough, such as a surface plough, harrow, seed drills, [reaping machine], &c. The connection with the motive-power is formed at each end of the said plate by means of wire ropes or other suitable material or means; one rope being passed over or partially round a pulley, and round a barrel worked by one stationary engine, and the other rope being passed over a similar pulley, and round a barrel worked by

“ another stationary engine ; one barrel winding while the other  
 “ is unwinding its rope. The said pulleys are respectively mounted  
 “ on rails properly supported, so as to admit of their being shifted  
 “ as required for working the agricultural implement over the  
 “ different parts of the land.”

[Printed, 2s.]

A.D. 1855, November 28.—N<sup>o</sup> 2686.

LEE, JOSEPH.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* “ Improvements  
 “ in agricultural or farmer’s engines, which improvements are  
 “ applicable also to locomotive engines.” No reference to the  
 working of field implements.

[Printed, 3d.]

A.D. 1855, December 7.—N<sup>o</sup> 2766.

WILLIAMS, JOHN ALLIN.—“ Peculiar construction and arrange-  
 “ ment of implements and framework for carrying the same for  
 “ cultivating land ; such implements answering, by slight modifi-  
 “ cations and adaptations, as scarifiers or grubbers, rafter ploughs,  
 “ horse hoes, and drags.” The implements are carried in a frame  
 running on a pair of small swivel or guide wheels in front, and  
 upon a pair of larger wheels at the rear. The beams of the imple-  
 ments slide at each end on vertical guide bars, and are raised or  
 lowered at each end simultaneously by means of chains, connected  
 to a roller which is turned by cross lever handles. “ Each im-  
 “ plement may be raised separately at the back end by a handle,  
 “ attached thereto for that purpose,—the beams being jointed to  
 “ vertical sliding blocks at the front end of the machine.  
 “ When the machine is used as a scarifier or grubber, common  
 “ plough bodies are employed, with land sides and coulter  
 “ attached, and having the ordinary point used for carrying the  
 “ common ploughshare ; the coulter being used only when found  
 “ desirable.” The share proposed to be used consists of “ an ordi-  
 “ nary ploughshare with a left-hand fin formed upon it. A small  
 “ turn-furrow of a peculiar construction is fitted to the plough  
 “ body, and consists of a steel plate, fitted or formed with a knife  
 “ or cutting edge at right angles or thereabouts to its surface,  
 “ working under the furrow and severing the same ; so that one



“ portion of the furrow slice will be cut and laid over the other  
“ part, thus leaving an uneven surface for the harrow teeth, in the  
“ subsequent operation of harrowing, to lay hold of.”

“ When used as a rafter plough, the 2nd and 4th implements  
“ and beams are removed, if 5 are used, and the common turn-  
“ furrow may be attached to the remaining three plough bodies,  
“ and used in the ordinary manner with the common ploughshare  
“ and coulter. If it be required to use the machine as a horse  
“ hoe, I remove the 2nd and 4th beams as before, and use the  
“ ordinary plough body and coulter in conjunction with the  
“ peculiarly formed double-fin ploughshare herein-before described,  
“ but having a rather wider fin, if found desirable, whilst the  
“ peculiar turn-furrow and cutter is dispensed with.” “ When  
“ used as a drag, the whole of the beams may be used, but the  
“ plough bodies must be removed therefrom, and drag tines sub-  
“ stituted therefor.”

“ The machine may be drawn either by horses or hauled over  
“ the ground by steam-power if desired. It may also be made  
“ with 3 beams; and when used as a rafter plough or horse hoe  
“ would in that case require the centre beam to be removed whilst  
“ the outside ones do the work.”

[Printed, 9d.]

A.D. 1855, December 17.—No. 2848.

EVANS, OMROD COFFEEN.—“ Machine for spading or breaking  
“ up the earth preparatory to planting. The machine consists of  
“ a truck or cart, supporting a framework in which revolves a  
“ series of drums or broad-faced wheels side by side, each carrying  
“ an endless belt or chain, and upon which a series of spades or  
“ spading forks is placed. The operation of these is such, that as  
“ the machine is drawn over the ground, each spade is driven into  
“ the ground gradually and in successive order, and so as simply  
“ to pierce the same without breaking in the first instance. The  
“ upheaval or turning of the sod or earth is performed only at the  
“ time of leaving the ground.” Each endless chain is kept dis-  
tended by two pulleys, one before and the other behind the drum;  
and as the machine advances, the chain travels around the drum  
and pulleys,—each part successively descending to the ground  
and forming a kind of tramway for the drum, which rolls upon  
it and forces the spades or forks into the earth.

[Printed, 7d.]



A.D. 1855, December 21.—N<sup>o</sup> 2887.

KYLE, DAVID DUNNE.—“A method of communicating motion.” This invention relates to a method of communicating motion to the driving wheels of locomotive or portable steam-engines. It consists, “First, in placing a portion of the weight of the machine, “or engine, or load on the periphery or other concentric parts of “the propelling wheels, instead of on their axles; by this means “pressing downwards those parts of the wheels, and causing “them to move forward and revolve. And secondly, in applying “the machine or engine, which may be wrought by animal power, “in raising the weights in constant pressure on the propelling “wheels, and relatively to their progress.” The patentee says, “as this invention would be more particularly applicable to the “agricultural use of my machine for excavating and removing “earth, means would be attached to the engine, where necessary, “to level the ground or remove obstacles in advance of the propelling wheels.” The machine here referred to formed the subject of Letters Patent No. 86, October 1, 1852; and the description is included in this series of Abridgments.

In carrying out the present invention, the power of the engine is transmitted to the axle or axles of two small wheels with smooth peripheries, which bear upon the large running wheels and impart motion thereto, either alone or in conjunction with spur wheels. Or the large running wheels may be constructed in the form of “lantern wheels,” and the small wheels be made with teeth to gear therein.

[Printed, 9d. See also No. 86 (1852).]

A.D. 1855, December 28.—N<sup>o</sup> 2940.

BAILY, HENRY GEORGE.—“This invention has for its object “improvements in combining mechanical parts into a machine to “be worked by steam power in such manner that a series of “spades or forks, carried by a frame, shall be caused to descend “into the earth, then that each spade or fork shall act as a lever “on its fulcrum to lift its clod, and then to turn on its handle “or axis to cast the clod to the right or to the left of the position “from which the clod has been taken.” The frame, which is of a rectangular form, is suitably constructed to hold the straight handles of the spades or forks, and to permit them to turn freely at certain times;—each handle having a short projecting



arm at the lower part, and the several arms being connected by a straight bar, so as to move simultaneously. The spades or forks project in a row from the lower cross bar of the frame, with fixed cutters between them to divide the clods. The requisite motions for forcing the spades or forks into the earth and causing them to lift the clod is imparted to the frame by an inverted cylinder steam-engine; and when the frame has nearly assumed a horizontal position, a short arm on one of the handles comes in contact with a fixed stop, and the handles are thereby made to turn and cast off the clods. "The combined machinery is carried  
" by a suitable carriage on wheels, and provision is made to move  
" such carriage a proper distance at each time after turning over  
" a clod by each spade or fork; and this is done by the working  
" of the steam-engine, which gives motion at proper intervals to a  
" drum, which winds up a longer or shorter length of a wire rope,  
" and at the same time another drum unwinds a like quantity of  
" another wire rope, according as each of the spades or forks is to  
" dig or fork up a smaller or larger clod."

[Printed, 3s. 7d.]

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1856.

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A.D. 1856, January 3.—N<sup>o</sup> 27.

FOWLER, JOHN, junior.—This invention consists in a peculiar combination of machinery for giving motion to ploughs and other implements used for cultivating land. For this purpose, two capstans or barrels are mounted on the same base plate or frame; and they receive motion from a portable steam-engine in such manner that when one of the barrels is being driven to wind on the wire rope used therewith, the other barrel is allowed to run free and to unwind the wire rope. The rope is fastened at its ends to the barrels or capstans, and is passed through two guide pulleys, anchored or fixed to the ground opposite to yet distant from each other, and also distant from the two barrels. Ploughs or other implements are attached to the rope at that part which

is between the two guide pulleys, so that when the rope is being wound on to one of the barrels and off the other, the implements will be moved in a direction from one guide pulley towards the other, to the distance desired; then when the action of the barrels is reversed, the implements will be moved in the opposite direction; and by varying the position of the two guide pulleys from time to time, the whole surface of the land may be subjected to the action of the ploughs or other implements.

[Printed, 8d.]

A.D. 1856, January 4.—N<sup>o</sup> 31.

HART, CHARLES.—*Void by reason of the patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* The first part of the invention relates to the construction of portable or locomotive steam-engines, adapted more particularly for agricultural purposes. After describing the general arrangement of the engine, the patentee says, "In order to facilitate the travelling upon soft land, I use a circular endless rail, wider and larger in diameter than the rim of the travelling wheels, fitted with suitable guides for keeping it in its proper position around the travelling wheels."

The second part of the invention consists in furnishing the portable locomotive engine with apparatus for tilling or cultivating land. For this purpose at the hinder part of the machine, near to the surface of the ground, is placed an adjustable horizontal shaft, armed with a number of tines or cultivators. As the engine travels over the land, a rotary motion is imparted to the shaft by suitable gearing, and the tines or cultivators are thereby caused to enter and break up the soil.

[Printed, 3d.]

A.D. 1856, January 11.—N<sup>o</sup> 87.

SMITH, WILLIAM.—"This invention has for its object improvements in ploughs and other cultivating implements which are put in motion, when in use, by steam or other power actuating a barrel or barrels, on to and off which ropes are wound. And my present improvements have for their object means of turning a plough or cultivating implement at the end of its course. For this purpose, I arrange the fore part of the plough or other implement in such manner that the two ends of the ropes used



“ may be both attached to the fore part of the plough or implement, and so that the end of the rope which is next to come into use, as the draft rope of the plough or implement, shall by the working of the engine or power, first act to turn the plough or implement, and the end of the rope previously acting as the draft rope shall pass from the front as the plough or implement turns into position.”

“ Another improvement consists in applying to such descriptions of ploughs or implements a leg or support, which is ordinarily above the land ; but when the plough or implement comes to the end of a course, the leg or support is lowered, so as to come on the land, by which the hinder part of the plough or implement is raised out of the land ; and then the plough or implement is turned on the leg or support, so as to come into position for performing a return course.”

[Printed, 9d.]

A.D. 1856, January 16.—N<sup>o</sup> 120.

FOWLER, JOHN, junior.—This invention consists, firstly, in working a subsoil or drain plough by combining “an upright or horizontal barrel or capstan on the same frame, platform, or base plate with an engine which gives motion to it, by which capstan or barrel the subsoil plough is moved by a wire rope ; and there is a second barrel for moving by another wire rope the engine and capstan from point to point along the headland. The machinery is arranged to make a direct pull on the plough, and is therefore moved a distance each time equal to that between drain and drain.”

“ The second part of the invention relates to the anchor or instrument used for holding on or resisting the movement of the engine, capstan or barrel, and pulleys when working with drain, subsoil, or other ploughs by power. For this purpose a plate or frame is used, which, when employed, is placed upright in a hole. On this plate or frame is hinged a lever, to the upper end of which a chain or rope is fixed. The lower end of this lever is formed with a broad end or plate, which, when the lever is pulled on, rests against the opposite side of the hole, and very securely anchors the engine and machinery which gives motion to the plough ; and when pulleys are used, they are similarly anchored.”

[Printed, 1s. 5d.]

A.D. 1856, February 9.—N° 345.

DUNCAN, JOHN WALLACE.—The last part of this invention relates to apparatus for impelling a raft or vessel through water and also over land or ice. The raft is supported by two buoyant metal cylinders with conical ends, which extend in a horizontal direction beneath the deck, and turn in bearings connected to the under side of the same; each cylinder being divided at the middle of its length into two parts, so as to form a space for the reception of gearing which communicates motion from a steam engine to the axis of the cylinder. The outer surfaces of the cylinders are furnished with spiral or screw blades, which impel the raft or vessel through the water, when immersed therein. "In travelling on land, the raft should be fitted with two or three plain cylinders, placed transversely to the screw cylinders," and supporting the weight of the raft, but at the same time permitting the screw blades to enter or take hold of the ground, in order to impel the raft. Instead of employing the screw blades as propellers while on land, the transverse plain cylinders may be lowered (so as to raise the screws blades from the ground), and the power of the engine applied to the plain cylinders for the purpose of impelling the raft. "Instead of making the screw cylinders inflexible in their length, they may consist of short lengths, fitted in their bearings so that they may accommodate themselves more or less to inequalities of the ground, or that the fore parts may be more or less inclined in order to mount over any obstacle or ascend an abrupt ascent."

The patentee says, "Another improvement under this head of my invention consists in constructing a machine on the principle of the raft last herein-before described, having cylinders with spirals or screws thereon, in the application of steam to cultivation, for the purpose of carrying or dragging implements or other things necessary over or through the land."

[Printed, 3s.]

A.D. 1856, February 28.—N° 512.

FOWLER, JOHN, junior, and GREIG, DAVID.—"This invention has for its object improvements in ploughing and tilling land when steam power is employed. For this purpose several ploughs or tilling instruments are placed at each end of a frame, in order that when the implements at one end of the frame go out of



“ work, the implements at the other end of the frame may come into action; the frame is mounted on an axle in the middle, and moves thereon as on a fulcrum. The machine has two or more wheels to run on, and is moved to and fro across the land by means of wire ropes, put into motion by a barrel or barrels caused to rotate by a steam-engine. By this arrangement, when the machine arrives at the end of its course in one direction, in place of having to turn it round, one set of implements go up out of action, and the other set of implements descend and come into action; and this is effected by the draft of the wire rope taking place in the opposite direction.”

[Printed, 9d.]

A.D. 1856, April 22.—N° 962.

SMITH, WILLIAM.—*Void by reason of the patentee having neglected to file a Specification in pursuance of the Letters Patent.*

“ This invention has for its object improvements in constructing and applying windlasses for working ploughs and other agricultural implements. For this purpose, the barrels of the windlass are mounted in a carriage, which, by preference, travels on two wheels, and is constructed with shafts to receive a horse. Two barrels are used, which are capable of turning independently of each other freely on the axle of the carriage;” and the barrels are driven alternately by gearing from “ a steam-engine which is on a separate carriage.”

[Printed, 3d.]

A.D. 1856, April 26.—N° 999.

LAWES, THOMAS.—*This invention did not proceed to the Great Seal.* It relates to a machine for digging or breaking up land by means of a rotating cylinder armed with tines or teeth, and consists in a method of raising the cylinder when the machine is to be turned, and afterwards lowering it again to its work.

[Printed, 3d. See also Nos. 92 (1852) and 92\* (1852).]

A.D. 1856, May 15.—N° 1153.

WILLIAMS, CHARLES RICHARD.—This invention consists of “ an implement or apparatus in which a series of prongs or blades, situated on a frame or carriage, are so mounted and connected with the wheels of the said carriage that as the said carriage is

“ drawn along, the said prongs or blades are made to descend  
 “ into and rise from the ground by a motion somewhat resembling  
 “ that of digging.” The prongs are arranged in two rows across  
 the frame. The upper end of each prong is straight, and the  
 lower end is curved nearly into a semicircular form, so as to some-  
 what resemble a reaping-hook with a long handle. The prongs  
 of each row are jointed at the top to short levers, which play upon  
 a fixed bar that extends horizontally across the machine; and at  
 the middle they are jointed to arms, projecting from clips or metal  
 bands which encircle a corresponding number of eccentrics, keyed  
 upon a horizontal shaft driven by gearing from the running wheels.  
 “ The lower pointed and curved ends of the prongs descend suc-  
 “ cessively into the ground, each of the said prongs or blades  
 “ having an advancing as well as a descending motion; after  
 “ having attained the maximum depth, the prongs or blades  
 “ commence an ascending motion; the prongs or blades again  
 “ enter the ground at or near the place where they left it.”

[Printed, 6d.]

A.D. 1856, May 17.—N<sup>o</sup> 1166.

COLEMAN, RICHARD.—“ Improvements in implements for  
 “ ploughing, hoeing, and scarifying land,” consisting, firstly, “ in  
 “ supporting the frame or bar of the ploughing, hoeing, or scari-  
 “ fying instruments by two bars jointed thereto; which bars are  
 “ jointed to and supported from the frame or carriage of the  
 “ implement or machine. The bar or frame supporting the instru-  
 “ ment is held by these jointed bars in a position parallel, or  
 “ nearly so, to the surface of the land, and also to the carriage  
 “ or travelling frame of the machine, and maintains constantly  
 “ such parallelism when raised out of or when depressed and  
 “ inserted into the ground.” The machine may be drawn by  
 horse, steam, or other suitable power.

The second part of the invention relates to horse hoes or hoes  
 acted on by power, and consists “ in mounting the hoeing instru-  
 “ ments in a frame, which is fitted to the carriage in such manner  
 “ that it has a traversing motion from side to side independent  
 “ of the travelling carriage; in which motion it is controlled by  
 “ a rack and pinion, or other suitable mechanical equivalent,  
 “ actuated by the attendant walking behind,” whereby the hoes  
 may be guided so as to prevent injury to the crop.

[Printed, 1s. 1d.]



A.D. 1856, May 20.—N° 1186.

FOWLER, WILLIAM, and M<sup>c</sup>COLLIN, WILLIAM.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* “Improvements in portable steam-engines, “applicable to agricultural and other similar purposes.” The inventors describe an improved arrangement of portable steam-engine, but do not specify any mode of applying it to agricultural purposes.

[Printed, 3d.]

A.D. 1856, May 22.—N° 1228.

HOWARD, JAMES, and BAKER, GEORGE WILLIAMS.—“The “object of this invention is to facilitate the ploughing of land “both by steam and horse power.” In ploughing by steam, it is proposed “to use turn-wrest ploughs, and to attach any convenient number of chains or cords to a travelling frame, which is “drawn forward by means of a wire rope or chain, that passes “over guide pulleys set at opposite corners or other parts of the “field, and thence proceeds to the winding on and off barrels of “the engine. The chains or cords from the several ploughs pass “to their respective pulleys, which are mounted loosely on a shaft “extending from end to end of the draw-frame, and are held fast “when required by clutch-boxes operated by levers. This shaft “acts simply as a draw-bar until the frame has traversed a given “portion of the field; the frame then stops, and an axial motion “is given to the shaft to wind up the plough chains, and thus to “bring the ploughs to a line with each other at the end of the “furrow.” “When all have come up to line, the travelling “frame and ploughs are turned round to repeat the ploughing “operation in the opposite direction.” “The guide pulleys over “which the propelling rope or chain passes we provide with a “spherical boss, which fits a spherical projection on their axle. A “slight oscillating movement is thus allowed to these pulleys, to “permit of their self-adjustment to suit the direction of the “strain. The axles of the pulleys we propose to fix in position “by means of a kind of corkscrew anchor or holdfast. To assist “in the laying of the rope or chain upon the windlass, we propose “to use rotating guides. In cases where the engine is made to “travel over the field with the ploughs in action, we propose to

“ connect them to pulleys, as above described, but mounted on an axle at the tail of the locomotive engine.”

“ The turn-wrest ploughs which we propose to employ are fitted with handles as usual; and to each plough frame is attached two mould boards and shares, made right and left handed. These mould boards and shares, which are connected together, swing upon a common centre, set in the upper part of the frame; and they thus admit of the one rising out of its place while the other is being brought into position for work.” The ploughs are also suitably constructed for enabling the ploughman to adjust the draught, and to regulate the depth and width of the furrow. They may be worked either by horse or steam power.

[Printed, 1s. 1d.]

A.D. 1856, June 2.—N<sup>o</sup> 1309.

GROLEY, JOSEPH.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The inventor says, “ In order that a plough may stand steadily or be kept up when at work, whatever may be the motive-power applied to it, it is necessary that it should have three supports. The ordinary plough has only one support. My invention consists of a plough in which I provide the two additional or supplementary supports which it appears to require. These supports consist of wheels or shoes, one of which is fixed to the beam at the side opposite to the mould board, either behind or in front of the share.” “ The other wheel or shoe is placed in front of the beam, and travels in and regulates the depth of the furrow, I place a toothed regulator in front of the beam to regulate the width of the furrow and the draught.” “ Air, steam, or any other motive agent may be employed to drive my improved plough.”

[Printed, 3d.]

A.D. 1856, June 2.—N<sup>o</sup> 1310.

MARSDEN, EDWARD.—This invention consists in constructing implements, to be worked by steam, horse, or other power, “ which take up, pulverize, and cleanse land at one operation. They first take up a certain breadth of land upon a share, and then



“ bring to bear thereon, according to the land being in a wet or  
 “ dry state, mauls or rollers [which may have chisels, ribs, or  
 “ spikes attached thereto] to pulverize or reduce it. The land  
 “ next passes between rollers, and again between other rollers or  
 “ drums with teeth, in order thoroughly to disintegrate the land  
 “ and remove twitch, weeds, or roots therefrom; which twitch,  
 “ weeds, or roots are carried by a belt into a receiver. At the  
 “ same time that the twitch is removed, the machine takes up all  
 “ stones above a certain size, which are either deposited in a  
 “ receiver or thrown back upon the land as required.” The earth  
 is carried through the apparatus by an “ endless chain or belt,  
 “ composed of several chains or wires, or other suitable material,  
 “ with wires or rods fixed transversely thereon;” and when suffi-  
 ciently pulverized, the earth descends through the spaces between  
 the chains or wires, and either falls upon the ground beneath the  
 machine, or else it is received by an endless travelling band, which  
 deposits it in ridges at the side of the machine.

[Printed, 10d.]

A.D. 1856, June 23.—N<sup>o</sup> 1469.

ROGER, ROBERT.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* In the Provisional Specification the inventor says, “ My invention consists in  
 “ constructing a travelling windlass, to be actuated by the endless  
 “ cord of the Fiskens patent or other system of steam ploughing.  
 “ The travelling windlass to have two drums, either on separate  
 “ axles or on the same,—one to be winding on while the other is  
 “ winding off the rope. From the spur wheel attached to such  
 “ drums and driving them, I take a power by pinion and chain  
 “ wheel; I drive at each end of the said machine a revolving  
 “ cultivator in the form of a spiked roller or digging machine  
 “ wheel, having spiked teeth on bosses at certain intervals;—one  
 “ set of these is lowered in the ground and put in motion when  
 “ the machine is going in one direction; and when going in the  
 “ opposite direction this set is raised, and the other lowered into  
 “ the ground.”

“ I adapt the fixed windlass system of tillage to my rotary  
 “ cultivator by winding on one rope to one drum by means of  
 “ the paying out of another while the machine is hauled in the  
 “ other direction, so as to be in readiness to drive in paying out



“ when returning in the opposite direction. From the rotary motion thus obtained from a simple hauling motion, I drive, by means of a spur wheel attached to the drums, my rotary cultivator, as in the travelling windlass system. I also attach to the rotary motion thus obtained a chain of buckets and knives, similar to those used in a dredging machine, and a suitable ladder and raising and lowering apparatus for cutting drains to any depth, and a sloping platform to deliver the soil so raised and cut on one or both sides of the drain.”

[Printed, 3d.]

A.D. 1856, June 25.—N<sup>o</sup> 1495.

CHANDLER, ROBERT WILSON, and OLIVER, THOMAS.—The nature of the invention is thus explained by the patentees:—“ Our invention consists in fixing a drum, for holding the band, strap [traction rope], or chain employed with engines for ploughing and other agricultural purposes, upon the axle of the fore or hind wheels of the travelling engines now employed in connection with agriculture. Or we convert either fore or hind wheels into drums by raising them, by means of blocks or otherwise, from contact with the ground, and by screwing, bolting, or otherwise attaching flanges to the sides of the wheels, in order to prevent the band slipping off from them.”

[Printed, 9d.]

A.D. 1856, July 1.—N<sup>o</sup> 1540.

LONGRIDGE, JAMES ATKINSON.—These “ improvements in the application of mechanical motive-power to the field operations of agriculture consist in the application of a screw, somewhat similar to the well-known screw propeller, to the propulsion of a locomotive carriage over land for agricultural purposes;—the motive power being placed on the carriage, which moves on broad wheels [or rollers], while some portion of the weight rests on the screw propeller, which is partially immersed in the land. The motive power is applied to the rotation of the screw, which advances and propels the carriage over the ground. The implements of culture may either be affixed to the same carriage or attached to another frame or carriage impelled by the locomotive screw carriage.” The invention is stated to be “ principally



“ adapted for the traction of ploughs or other implements for  
“ inverting the soil, in which a great amount of tractive force is  
“ required ; or it may be adapted to implements for trenching or  
“ subsoiling, or for draining purposes,—that is to say, for laying  
“ down and introducing drain tiles or other medium for draining  
“ the land, or for the formation of ducts for that purpose.”

[Printed, 4d.]

A.D. 1856, July 10.—N<sup>o</sup> 1635.

FWLER, JOHN, junior, and WORBY, WILLIAM.—“ Improvements in machinery for ploughing and tilling land by steam.”

“ Giving motion to a plough or other tilling instrument by means of an engine on a carriage with two winding drums, mounted each on a vertical axis ; such engine traversing on the headland as the work progresses, so as to draw the plough, and working a plough or tilling instrument in both directions ;” one drum being driven by the engine in order to wind up its wire rope, while the other drum is running free and unwinding its rope.

“ Giving motion to a plough or other tilling instrument by means of two engines, each on a carriage with a single winding drum, mounted on a vertical axis ; such engines traversing on the opposite headlands, and each working so as to draw the plough or other tilling instrument towards itself.”

Arranging ploughs “ in combination with rotating harrows in such manner that the mould boards of the ploughs raise the land from the furrows over the teeth of the rotating harrows, which work and break up the land so brought up to the harrow.”

Also, when ploughing by steam, using “ as an anchor a carriage with disc wheels, which in being dragged along cut into the land, and the tackle [for drawing the ploughs] being fixed to the side of the carriage, is resisted by the wheels so sunk into the land.” The carriage is furnished with two pairs of discs ; and upon the axis of each pair is mounted a roller, which travels on the surface of the ground and sustains the weight of the carriage.

[Printed, 2s. 6d.]

A.D. 1856, July 12.—N° 1648.

POPE, JOHN.—*Void by reason of the patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* The subject of these Letters Patent is thus described by the inventor in the Provisional Specification:—"My invention of improvements in the application of steam power to ploughing consists in the application of a light locomotive engine, mounted on broad wheels or rollers, having transverse ribs projecting on the periphery, or other suitable projections, to hold the ground and afford sufficient bite for traction: the breadth of the wheels or rollers at the same time prevents any prejudicial sinking in the ground. I attach the ploughs by suitable traction bars or chains, using a sufficient number to plough at one time (or nearly so) the breadth covered by the wheels or rollers. All the ploughs are arranged the one in the rear of the other, with room to work, the second plough throwing the land into the furrow made by the first, and the third one throwing the land into the furrow made by the second, and so on. Each plough has a man in the handles to guide and control it in the usual manner. Other implements may be attached to this engine and dragged over the ground in the same manner."

[Printed, 3d.]

A.D. 1856, August 18.—N° 1926.

CAMBRIDGE, WILLIAM COLBORNE.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* It is thus described by the inventor:—"My invention of improvements in the construction of portable railways consists in adapting to the running wheels of portable engines used principally for agricultural purposes, or to the running wheels of various agricultural implements, waggons, carts, or carriages, of a flexible metallic road or railway, composed of sections or parts of any convenient length, and adapted to the outside of the wheel in such a manner that the said sections or parts of the portable railway may, as the carriage, engine, or implement advances, be laid down on the ground, so as to allow the wheels of the carriage to pass over the same, in the same way that the



“ wheels of a locomotive engine or railway carriage pass over the  
 “ fixed rails of a railway.

“ In making my portable railway, I construct it of broad plates  
 “ or sheets of iron, which will have an extensive bearing on the  
 “ surface of the ground, so that on a soft soil the carriage may  
 “ be supported on the surface without sinking in. On the top  
 “ and along the centre of these plates or sheets is fixed a raised  
 “ rail, of such a length as to admit of the several successive lengths  
 “ of rail meeting or abutting against each other, end for end, so  
 “ as to form a continuous rail under the wheels. I propose that  
 “ the broad plates or sheets of iron be provided at each side with  
 “ flanges or angle iron, to prevent the earth from squeezing over  
 “ the edges of the plates, and being lifted thereby. The several  
 “ sections or parts of which the portable railway is composed are  
 “ connected to centres by means of arms, which, as the carriage  
 “ advances, lay down the sections successively in front of the  
 “ wheels, and take them up again when the wheels have passed  
 “ over.”

[Printed, 3d.]

A.D. 1856, August 25.—N<sup>o</sup> 1978.

BARRAT, PIERRE PHILIPPE CELESTIN, and BARRAT, JEAN BAPTISTE.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The inventors state that it consists of “ improvements in and modifications of the  
 “ steam digging machinery patented on our behalf, and as a  
 “ communication from us, by J. H. Johnson, on the 10th May  
 “ 1853;” but this statement has been found to be incorrect,—reference should have been made to Letters Patent No. 11,977, November 25, 1847. The improvements are, 1. “ Placing the large  
 “ motive or running wheels behind the furnace.”

2. “ Forming the wheels with a sheet iron felloe, bolted or  
 “ rivetted to flat or T-iron spokes, shaped like a truncated isosceles  
 “ triangle, converging to and supported by the nave.”

3. “ Dividing the nave of the large wheels into two parts, so  
 “ that the wheels may slightly incline on the axle.”

4. “ Having a certain amount of play between the nave and  
 “ axle.”

5. Arrangement for throwing either of the motive or running  
 wheels out of gear without stopping the revolution of the axle.

6. "Modifying the arrangement of gearing for driving the fore carriage wheels simultaneously with the large motive or running wheels."
7. "Placing shoes, skids, or guards on the peripheries of the motive wheels."
8. "So arranging the axle of the fore carriage that it may follow the undulations of the soil."
9. "Employing steam to tilt or incline the fore carriage in working a curve or turning the machine."
10. "Connecting in a straight line the digger frame or carrier and the framework of the engine."
11. "So arranging the digger shaft that it may be moved nearer to or further from the soil without interfering with the other parts of the machine."
12. "Effecting the up and down action of the diggers by cams and connecting rods, by toothed wheels, or by cranks and levers."
13. "Employment of a stop on the frame to regulate the back stroke of the diggers."
14. "Employment of two diggers or digger cylinders of different lengths on the same stock, placed at a greater distance from each other than the thickness of the strip of soil to be loosened, and contrived to effect a better division or loosening of the soil."
15. "Employment of three or more diggers or digger cylinders on the same stock, at a greater distance one from the other than the thickness of the strip of earth to be loosened,—the length increasing as they approach the bottom of the stock."
16. "Applying the machinery for excavating and digging canals and drains."
17. "Mounting forks or teeth behind the engine-driver's seat or the digger carrier, to pulverize and break up the earth."
18. "Employing fixed cylinders (instead of oscillating cylinders) with connecting rods for transmitting the action of the piston to the levers which carry the digging shaft."
19. "Dispensing with one of the shafts which carry the gearing wheels (and employing other gear wheels)."
20. "Applying the apparatus for reaping by employing reaping apparatus in place of the diggers."



A.D. 1856, September 5.—N<sup>o</sup> 2065.

MONCKTON, HENRY EDWARD CRADOCK, and CLARK, WILLIAM.—First,—“ a rotatory tilling instrument for cutting up and  
“ inverting the soil, which instrument has a longitudinal motion  
“ imparted to it in the direction of the length of its axis simul-  
“ taneously with its motion of rotation. This rotatory tiller may  
“ consist of blades [or prongs or tines] wound helically round the  
“ axis, but of an increasing diameter, so that when rotating rapidly  
“ [it] will represent the appearance of a cone.” “ The tilling in-  
“ strument, while rotating, travels with the axis advancing with  
“ the small end of the cone first, and produces a trench or furrow,”  
cutting the soil from the land side. “ It operates first on the  
“ surface soil, which it throws into the trench previously made ; as  
“ the larger part of the cone advances it cuts deeper, and throwing  
“ the soil taken from the greatest depth for the most part on the  
“ top of that first removed. By making this tilling instrument  
“ double coned, that is, coned towards both ends, it can be worked  
“ backwards and forwards, and so continue its workings without  
“ the necessity of turning the machine round at the headlands.”  
The instrument is actuated by steam power ; and for this purpose  
it is connected to the side of a steam carriage, which travels on the  
land side or unbroken land. The carriage is supported by two  
“ broad rollers, formed with ribs on their peripheries, to give them  
a firm hold of the ground ; “ or it may be carried over the ground  
“ by any suitable machinery of support having propelling power  
“ applied thereto.”

Secondly, a digging machine worked by steam power, and con-  
sisting of “ successive rows or series of spade-like diggers, put in  
“ motion by means of cranks or other suitable means. These  
“ diggers individually do not dig deeper than about one and a  
“ half or two inches, but the successive rows are placed at different  
“ elevations, forming an incline from the front to the rear of the  
“ machine. In operating with the instrument, an inclined trench  
“ or space equal to the area of the digging frame [is made], and  
“ the machine is placed therein.” As it advances, “ each row  
“ across the breadth of the machine enters the ground to the  
“ depth of two inches and tosses the soil in a backward direction ;  
“ each successive row being deeper than that preceding it, the last  
“ in succession, although only penetrating the new ground to the

“ depth of two inches, yet, by reason of its inclined position, it is digging the earth some eight or ten inches below the original surface.” The machine is supported by a broad roller in front, and by two broad wheels behind.

Thirdly, “ a modification of this machine consists in the application of a series of rotary diggers in lieu of the vertical or inclined spade diggers. These consist of cylinders with radial digging tines or teeth, the cylinders being placed one behind the other, and each in succession at a lower level, so as to work in an inclined trench or space, which their action maintains as the machine advances.”

“ A further addition to these last machines consists in the application of two scrapers, one on either side of the machine, which scrape the surface soil from the land on each side into the lower or deepest part of the trench as the machine progresses.”

[Printed, 1s. 5d.]

A.D. 1856, September 8.—N<sup>o</sup> 2089.

FOWLER, JOHN, junior. — “ Improvements in machinery or apparatus for ploughing and tilling land by steam.” The first improvement relates to the invention described in the Specification of Letters Patent No. 512, February 28, 1856, in which a lever frame mounted on a central axle, supported by running wheels, is fitted with a set of ploughs or other tilling implements at each end,—one set going out of action as the other set descends and comes into action. The improvement consists in “ applying a ‘locking’ motion to the central axle and wheels, so as to cause the ploughing machine to be guided; and such guiding is accomplished by the ploughman who accompanies the machine giving motion to a screw or other convenient apparatus acting on the central axle, so as to cause it and the wheels thereon to perform the requisite locking motion.”

The second part of this invention consists in a mode of communicating motion to the anchor carriage described in the Specification of Letters Patent No. 1635, July 10, 1856. For this purpose “ the axle of the pulley carried by such carriage, and around which the draft rope passes, is caused to give motion, by intermediate gearing, to the axle or axles of the disc wheels on which such anchoring carriage moves; by which means the draft rope



“ put in motion by a steam-engine, in addition to moving the  
“ ploughs or tilling instruments, gives motion to the anchoring  
“ carriage.”

[Printed, 1s. 1d. See also Nos. 512 (1856), and 1635 (1856).]

A.D. 1856, September 11.—N° 2121.

ROBINSON, JOHN BLYTHE (*a communication from Robert Romaine*).—Improvements in the steam digging or tilling machinery described in the Specifications of Letters Patent No. 1151, May 10, 1853, and No. 35, January 6, 1855. In this case the digging machine is not drawn by horse power, but it is propelled by the steam-engine which actuates the digging cylinder. The machine travels on a pair of front “caster wheels,” whereby it can be guided, and upon a pair of large and broad hind wheels, having a groove in the middle of the periphery, with teeth formed therein, to gear with pinions by which they are put in motion,—such teeth consisting of bolts, passed transversely through the rim and encircled by ferrules: if preferred, the teeth may project from either side of the rim, instead of being situated in the middle of the same. The boiler is of the same form as the ordinary locomotive engine boiler, fitted with two outside cylinders, the piston rods whereof are connected by rods with the crank bosses of two fly wheels fixed on the ends of a transverse horizontal shaft, placed behind the large running wheels. Each fly-wheel has a grooved periphery to receive an endless band when the engine power is not employed in cultivating, but in performing other work. Upon the shaft, at the side of each fly-wheel, is a spur pinion, which communicates motion, through a spur wheel on a transverse shaft below, to a spur wheel on the axle of the digger cylinder. Each transverse shaft carries a pair of pinions, to work in the teeth of the large running wheels;—the pair on the upper shaft being put into gear for the fast motion; and the other pair being put into gear for the slow motion.

A modification of the machine is described, in which the steam cylinders are placed in the bottom of the smoke box, with the working parts of the engines beneath the boiler, similar to the ordinary inside-cylinder locomotive, except that the crank or driving shaft is continued to the outside of the framing, and passes through the short hollow axles of the large hind wheels: the steam cylinders may, however, be placed at the top of the smoke-box or



at the top of the fire-box. The crank shaft carries at each end a fly wheel with a crank boss, connected by a rod with a crank on the axis of a pinion which gears into a spur wheel on the axle of the digging cylinder. From the crank shaft motion is also communicated, through spur gearing, to a transverse shaft, carrying two pinions which gear into teeth on the inner surface of the rims or tires of the large running wheels. For soft and wet soils, the bite of the wheels is increased by fixing conical or rectangular spikes or studs on the periphery.

The digging cylinder is furnished with a series of "separate" knives or cutters, so formed that no portion of their surface "except their cutting edges shall be exposed to the resistance of" the soil in effecting its abrasion." Two forms of cutters are represented. One is similar to the common blades or hoes of a horse hoe,—the end of the stem, which is bolted to the cylinder, being turned at a right angle. The other resembles a lozenge or rhomb, carried by a curved stem, affixed to the cylinder.

[Printed, 1s. 1d. See also Nos. 1151 (1853), 41 (1854), 1487 (1854), 35 (1855), and 35\* (1855).]

A.D. 1856, October 17.—N<sup>o</sup> 2441.

LAWES, THOMAS.—*This invention did not proceed to the Great Seal.* It consists in a method of raising or lowering the cylinder containing the tines or teeth of a machine employed for tilling or digging the land, so as to discontinue the operation of digging or enable the machine to be turned round when necessary.

[Printed, 3d. See also Nos. 92 (1852), 92\* (1852), and 999 (1856).]

A.D. 1856, October 30.—N<sup>o</sup> 2552.

HOLCROFT, HENRY.—"Improved construction of steam-engine, specially adapted for the tillage of land; which engine is propelled by means of a traction screw or propeller. By the addition of pulleys it may be employed for driving machinery, for manufacturing drainage pipes, for thrashing grain, and other agricultural purposes." "The traction screw, which is placed in front at a right angle to the axis of the boiler, is composed of a cylinder, having one, two, or more threads formed upon it; or it may consist of a propeller formed of a single or double series of blades, placed at a suitable angle and fixed to the axis, which works in bearings on the lower part of a vertical telescopic tube or cylinder, which slides vertically up and down, as well as a



“ motion round its axis, in an outer case or cylinder firmly fixed  
 “ to a plate on the boiler. At the upper part of the telescopic  
 “ cylinder is a steam cylinder and piston, the rod of which actuates  
 “ by a crank the traction screw.” Suitable apparatus is provided  
 for lowering and raising the telescopic cylinder and with it the  
 traction screw. At starting, rotary motion is first communicated  
 to the screw, which is then lowered until it has entered the soil to  
 the required depth. By the continued rotation of the screw the  
 steam-engine, which is mounted on two pairs of running wheels, is  
 caused to advance over the land, and draw the ploughs or other  
 implements attached to it.

[Printed, 1s. 3d.]

A.D. 1856, November 5.—N<sup>o</sup> 2607.

BLACKWELL, WILLIAM.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* This invention consists “in suspending (by links) beneath a frame or  
 “ carriage, mounted on wheels, one, two, three, or more ploughs,  
 “ in such manner that they can be simultaneously lifted (by a  
 “ lever) out of and clear of the earth, while removing the whole  
 “ from one course of furrows to commence another, or to a  
 “ separate field, or to a distant part in the same field. The whole  
 “ is supported on wheels, which are mounted in forks, and are  
 “ capable of being swivelled partly round in any required direction.”  
 “The draught chains may be applied directly to the beams of the  
 “ ploughs, or partly to the carriage and ploughs, so as to divide  
 “ the draught between them.” “The shares and mould boards are  
 “ made in a piece, either by hammering or casting them, and  
 “ are securely fixed to the beams at top.” The inventor dispenses  
 with side and sole plates.

[Printed, 3d.]

A.D. 1856, December 11.—N<sup>o</sup> 2947.

CAMBRIDGE, WILLIAM COLBORNE.—Endless railway for  
 facilitating the movement of portable engines, carriages, steam  
 ploughs, or other agricultural implements over loose ground and  
 irregular surfaces. To each wheel is adapted “a set of plates or  
 “ sustaining pieces, made flat on their under face, which severally  
 “ receive in turn the pressure of the wheel as it revolves. These  
 “ sustaining pieces are connected together by being jointed to a



“double set of levers, which act as links, and bind all the parts together into an endless railway. At about the middle of the length of the sustaining pieces, and at either side thereof, lugs are formed to receive the junction pins of the levers or links.” The sustaining pieces are provided with bearing rails to receive the pressure of the periphery of the wheel; and being thus supported at the middle of their length, they are severally free to take up a horizontal position, or adjust themselves to the irregularities of the road or way before the pressure of the running wheel comes upon them.” Side pieces or guides are fixed to the sustaining pieces on each side of the bearing rail, so as to form a kind of groove in which the wheel runs, and is thus kept on the rail. The railway is not fastened to the wheel, but merely forms a kind of endless chain around the periphery, from which it may be removed by simply withdrawing the junction pin or bolt from one of the pairs of levers or links, so as to break the continuity of the endless chain.

[Printed, 5d.]

A.D. 1856, December 31.—N<sup>o</sup> 3102.

BRAY, WILLIAM.—“Improvements in traction engines.” The patentee remarks that “the wheels of traction engines, adapted for ploughing or dragging weights over soft ground, have not sufficient hold upon the ground if constructed in the ordinary manner. By my improvements I construct the wheels with teeth or blades which enter the ground and obtain a firm hold. These teeth are made to slide or move in and out by an eccentric or other mechanical means, so that they clear themselves of the soil and are again ready to enter the ground. The eccentric is capable of adjustment, so that the projection of the teeth may be varied; and thus the wheel may at pleasure be made to act like an ordinary wheel. This adjustment enables the wheels to run well upon hard ground when required.” “When the engine is employed to drive a thrashing machine or other machinery, both wheels are disconnected, and the eccentrics may be set so as to cause the blades to protrude at the lower part, and assist in scotching the wheels or preventing the engine from shifting from its place.” The engine may have two driving wheels, or it may be furnished with only one driving wheel, constructed as above described.

[Printed, 10d.]



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Atkins, 66, 74.  
Gioley, 108.

## Hoeing-machines :

Pratt, 9.  
Stace & Vallance, 25.  
Lillie, 34.  
Martin, 50.  
Ford, 89.  
Hanson, 93.  
Halkett, 94.  
Raywood, 96.  
Williams, 98.  
Coleman, 106.

## Impelling legs :

Tindall, 11.  
Gordon, 13.  
Nicolas, 21.  
Teissier & Triat, 26.  
Pape, 46.  
Kyle, 51.

Manuring land and sowing  
seed :

Ramsey & Wildgosse, 1.  
Ramsey, 1, 2.  
Pratt, 9.  
Tindall, 11.  
Reynolds, 11.  
Stace & Vallance, 25.  
Holland, 32.  
Lillie, 34.  
Hodge, 42.  
Pidding, 43.  
Hall, 56.  
Chrippes, 57.  
Baron von Gilgenheimb, 61.  
Johnson, 62.  
Atkins, 66.  
Dussac, 70.  
Kelly, 72.  
Johnson, 73.  
Atkins, 74.  
Johnson, 78.  
Cole, 79.  
Bittleston, 82.  
Johnson, 83.  
Fisken & Fisken, 91.  
Hanson, 93.  
Halkett, 94.  
Raywood, 96.  
Lacy, 97.

## Ploughing, apparatus for :

Ramsey & Wildgosse, 1.  
Brouncker, Aprice, & Parham, 1.  
Ramsey, 1.  
Parham, Prewett, Prewett, & Dor-  
ney, 2.  
Moore, 2, 3, 4.  
Dumbell, 8.  
Pratt, 9.  
Tindall, 11.  
Reynolds, 11.  
Gordon, 13.  
Clive, 14.  
Heathcoat, 14.  
Upton, 17.  
Campbell & White, 18.  
Pinkus, 18.  
MacRae, 21.  
Campbell & White, 23.  
Pinkus, 23.  
Stace & Vallance, 25.  
Teissier & Triat, 26.  
Clarke, Freeman, & Varley, 26.  
Anderson, 27.  
Osborn, 29.  
Lillie, 34.  
Usher, 38.

Ploughing, apparatus for —  
*continued.*

Callaway & Purkis, 39.  
Cowing, 40.  
Pape, 46.  
Pidding, 48.  
Marshall, 52.  
Chrippes, 57.  
Curtis, 59.  
Arnoux, 65.  
Atkins, 66.  
Southan, 67.  
Dussuc, 70.  
Atkins, 74.  
Williams, 77.  
Cole, 79.  
Hancock, 81.  
Bittleston, 82.  
Bousfield, 85.  
Williams, 86.  
Coleman, 88.  
Ford, 89.  
Fisken & Fisken, 91.  
Halkett, 94.  
Raywood, 96.  
Lacy, 97.  
Williams, 98.  
Fowler, 101.  
Smith, 102.  
Fowler, 103.  
Fowler & Greig, 104.  
Smith, 105.  
Coleman, 106.  
Howard & Baker, 107.  
Grole, 108.  
Marsden, 108.  
Roger, 109.  
Chandler & Oliver, 110.  
Longridge, 110.  
Fowler & Worby, 111.  
Pope, 112.  
Fowler, 116.  
Holcroft, 118.  
Blackwell, 119.  
Cambridge, 119.  
Bray, 120.

Ploughs acting in a circular direction :

Pratt, 9.  
Usher, 38.  
Cole, 79.  
Ford, 89.

Ploughs combined so as to act alternately in opposite directions :

Pratt, 9.  
Pinkus, 18.  
MacRae, 21.  
Pinkus, 23.  
Osborn, 29.  
Curtis, 59.  
Williams, 77.  
Bousfield, 85.

Ploughs combined so as to act alternately in opposite directions—*continued.*

Fisken & Fisken, 91.  
Halkett, 94.  
Lacy, 97.  
Fowler & Greig, 104.  
Howard & Baker, 107.

Ploughs with a traversing movement across their carriage :

Pratt, 9.  
Callaway & Purkis, 39.

Portable or travelling agricultural engines :

Moore, 2, 3, 4.  
Dumbell, 8.  
Pratt, 9.  
Tindall, 11.  
Reynolds, 11.  
Gordon, 13.  
Clive, 14.  
Heathcoat, 14.  
Upton, 17.  
Pinkus, 18.  
Nicolas, 21.  
Pinkus, 23.  
Teissier & Triat, 26.  
Clarke, Freeman, & Varley, 26.  
Anderson, 27.  
Osborn, 29.  
Holland, 32.  
Lillie, 34.  
Barrat, 36.  
Exall, 37.  
Campbell, 38.  
Garrett, 38.  
Usher, 38.  
Callaway & Purkis, 39.  
Hodge, 42.  
Hornsby, 43.  
Tuxford, 43.  
Guthrie, 45.  
Brown, 46.  
Pape, 46.  
Exall, 47.  
Brown, 54.  
Fowler, 55.  
Chrippes, 57.  
Bethell, 57.  
Allchin, 59.  
Curtis, 59.  
Clayton & Shuttleworth, 62.  
Johnson, 62.  
Hippisley, 63.  
Hoskyns, 68.  
Dussuc, 70.  
Bauer, 71.  
Kelly, 72.  
Johnson, 73, 78.  
Cole, 79.  
Maggs, 82.  
Bentall, 82.  
Johnson, 83.



Portable or travelling agricultural engines—*continued.*

Bousfield, 85.  
 Williams, 86.  
 Ford, 89.  
 Balk, 91.  
 Halkett, 94.  
 Lee, 98.  
 Kyle, 100.  
 Baily, 100.  
 Hart, 102.  
 Fowler, 103.  
 Duncan, 104.  
 Fowler & McCollin, 107.  
 Howard & Baker, 107.  
 Chandler & Oliver, 110.  
 Longridge, 110.  
 Fowler & Worby, 111.  
 Pope, 112.  
 Barrat & Barrat, 113.  
 Monckton & Clark, 115.  
 Robinson, 117.  
 Holcroft, 118.  
 Cambridge, 119.  
 Bray, 120.

## Portable railways for agricultural purposes; comprising—

Circular rails;  
   Pidding, 48.  
   Hart, 102.  
 Endless chains of rollers;  
   Edgeworth, 4.  
   Pidding, 31, 48.  
 Endless chains of short rails;  
   Edgeworth, 4.  
   Heathcoat, 14.  
   Pinkus, 18.  
   Pidding, 31.  
   Lillie, 34.  
   Pidding, 48.  
   Raywood, 96.  
   Evans, 99.  
   Cambridge, 119.  
 Series of rails applied separately  
   to the wheel;  
   Nicolas, 21.  
   Boydell, 30.  
   Marshall, 52.  
   Boydell, 74.  
   Cambridge, 112.  
 Series of rails laid upon the  
   ground;  
   Crosskill, 73.  
   Westley, 75.  
   Crosskill, 80.

## Reaping and mowing machines :

Tindall, 11.  
 Pinkus, 18, 23.  
 Lillie, 34.  
 Chrippes, 57.  
 Johnson, 62.

Reaping and mowing machines  
—*continued.*

Atkins, 66.  
 Johnson, 73.  
 Atkins, 74.  
 Williams, 86.  
 Fiskien & Fiskien, 91.  
 Halkett, 94.  
 Lacy, 97.  
 Barrat & Barrat, 113.

Revolving harrows, cultivators,  
diggers, and clod-crushers :

Vaux, 17.  
 Pinkus, 18, 23.  
 Hall, 25.  
 Stace & Vallance, 25.  
 Beart, 27.  
 Bonser & Pettitt, 23.  
 Huddart, 32.  
 Paul, 33.  
 Lillie, 34.  
 Usher, 38.  
 Guthrie, 45.  
 Brown, 46.  
 Roberts, 47.  
 Martin, 50.  
 Kyle, 51.  
 Lawes, 53.  
 Brown, 54.  
 Samuelson, 55.  
 Bethell, 57.  
 Murphy, 58.  
 Newton, 60.  
 Baron von Gilgenheimb, 61.  
 Johnson, 62.  
 Wilson, 64.  
 Newton, 66.  
 Atkins, 66.  
 Hoskyns, 68.  
 Brooman, 68.  
 Jeanneret, 70.  
 Dussuc, 70.  
 Kelly, 72.  
 Johnson, 73.  
 Atkins, 74.  
 Southall, 76.  
 Williams, 77.  
 Johnson, 78, 83.  
 Williams, 86.  
 Ford, 89.  
 Hanson, 93.  
 Halkett, 94.  
 Evans, 99.  
 Kyle, 100.  
 Hart, 102.  
 Lawes, 105.  
 Marsden, 108.  
 Roger, 109.  
 Fowler & Worby, 111.  
 Barrat & Barrat, 113.  
 Monckton & Clark, 115.  
 Robinson, 117.  
 Lawes, 118.

## Rolling land, apparatus for :

Pratt, 9.  
 Reynolds, 11.  
 Heathcoat, 14.  
 Stace & Vallance, 25.  
 Callaway & Purkis, 39.  
 Hall, 56.  
 Cole, 79.  
 Williams, 86.  
 Fiskén & Fiskén, 91.  
 Halkett, 94.  
 Raywood, 96.

## Ropes or chains which travel between boats or barges in canals on opposite sides of the field :

Pratt, 9.  
 MacRae, 21.  
 Osborn, 29.

## Ropes or chains which travel between carriages or pulleys on opposite sides of the field :

Pratt, 9.  
 Heathcoat, 14.  
 Pinkus, 18, 23.  
 Stace & Vallance, 25.  
 Clarke, Freeman, & Varley, 26.  
 Osborn, 29.  
 Lillie, 34.  
 Curtis, 59.  
 Atkins, 66, 74.  
 Fiskén & Fiskén, 91.  
 Halkett, 94.  
 Lacy, 97.  
 Fowler, 101.  
 Fowler & Greig, 104.  
 Howard & Baker, 107.  
 Roger, 109.  
 Fowler & Worby, 111.  
 Fowler, 116.

## Screw form, implements partly or wholly of a :

Lumbert, 7.  
 Hall, 25.  
 Bonser & Pettitt, 28.  
 Huddart, 32.  
 Bethell, 57.  
 Southan, 67.  
 Southall, 76.  
 Johnson, 78, 83.  
 Monckton & Clark, 115.

## Screw-propellers, actuating implements by :

Lumbert, 7.  
 Southan, 67.  
 Duncan, 104.  
 Longridge, 110.  
 Holcroft, 118.

## Single broad running wheel or roller, fitting implements with a :

Pape, 46.

## Steam-power, methods of employing, for giving motion to implements generally (not particularized) :

Ramsey & Wildgosse, 1.  
 Ramsey, 1, 2.  
 Moore, 2, 3, 4.  
 Dumbell, 8.  
 Pratt, 9.  
 Tindall, 11.  
 Reynolds, 11.  
 Gordon, 13.  
 Clive, 14.  
 Heathcoat, 14.  
 Upton, 17.  
 MacRae, 21.  
 Nicolas, 21.  
 Teissier & Triat, 26.  
 Claussen, 28.  
 Osborn, 29.  
 Lillie, 34.  
 Usher, 38.  
 Exall, 47.  
 Samuelson, 55.  
 Chrippes, 57.  
 Johnson, 62.  
 Atkins, 66, 74.  
 Williams, 86.  
 Coleman, 88.  
 Ford, 89.  
 Fiskén & Fiskén, 91.  
 Halkett, 94.  
 Lacy, 97.  
 Fowler, 101.  
 Smith, 102.  
 Duncan, 104.  
 Fowler & Greig, 104.  
 Smith, 105.  
 Chandler & Oliver, 110.  
 Longridge, 110.  
 Fowler & Worby, 111.  
 Fowler, 116.  
 Holcroft, 118.

## Watering land :

Holland, 32.  
 Lillie, 34.  
 Pidding, 48.  
 Hall, 56.  
 Halkett, 94.

## Water-power, working implements by :

Moore, 2.  
 Saxton, 15.  
 Stollmeyer, 24.  
 Osborn, 29.  
 Atkins, 66, 74.



Waves, working implements by  
the power of the :  
Stollmeyer, 24.

Wheels with broad tires and  
rollers, mounting implements  
on :

Lunbert, 7.  
Reynolds, 11.  
Clive, 14.  
Heathcoat, 14.  
Vaux, 17.  
Bonser & Pettitt, 28.  
Lillie, 34.  
Barrat, 36.  
Usher, 38.  
Callaway & Purkis, 39.  
Fowler, 40.  
Thompson, 43.  
Fowler, 44.  
Guthrie, 45.  
Pape, 46.  
Exall, 47.  
Fowler, 55.  
Hall, 56.  
Chrippes, 57.  
Curtis, 59.  
Johnson, 62.  
Hoskyns, 68.  
Bauer, 71.  
Johnson, 78.  
Cole, 79.  
Johnson, 83.  
Ford, 89.  
Duncan, 104.  
Longridge, 110.  
Fowler & Worby, 111.  
Pope, 112.  
Monckton & Clark, 115.  
Robinson, 117.

Wheels with spikes, projections,  
or ribs :

Pinkus, 18, 23.  
Pape, 46.  
Exall, 47.  
Martin, 50.  
Curtis, 59.  
Hoskyns, 68.  
Hanson, 93.  
Pope, 112.  
Monckton & Clark, 115.  
Robinson, 117.  
Bray, 120.

Wheels with teeth to gear into  
fixed racks :

Halkett, 94.

Wind, giving motion to imple-  
ments by :

Pratt, 9.  
Tindall, 11.  
Stollmeyer, 24.  
Stace & Vallance, 25.  
Atkins, 66, 74.

Winding up a rope or chain,  
drawing implements by :

Brouncker, Aprice, & Parham, 1.  
Parham, Prewett, Prewett, & Dor-  
ney, 2.  
Lumbert, 7.  
Dobits, 8.  
Hickford, 10.  
Thomas, 12.  
Cowper, 12.  
Heathcoat, 14.  
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Fowler, 101.  
Smith, 102.  
Fowler, 103.  
Fowler & Greig, 104.  
Smith, 105.  
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Roger, 109.  
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Fowler & Worby, 111.  
Fowler, 116.





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| Carlisle ( <i>Free Library, Police Office</i> ).                                                 | Northampton.                                                                     |
| Chester ( <i>Town Hall, Northgate St.</i> ).                                                     | Norwich ( <i>Free Library, St. John's, Maddermarket</i> ).                       |
| Cork ( <i>Royal Cork Institution, Nelson Place</i> ).                                            | Nottingham ( <i>Corporation Rooms, St. Peter's Churchside</i> ).                 |
| Crewe ( <i>Railway Station</i> ).                                                                | Oxford ( <i>Public Free Library, Town Hall</i> ).                                |
| Darlington.                                                                                      | Paisley ( <i>Government School of Designs, Gilmour Street</i> ).                 |
| Drogheda.                                                                                        | Plymouth ( <i>Mechanics' Institute, Princess Square</i> ).                       |
| Dublin ( <i>Royal Dublin Society, Kildare Street</i> ).                                          | Preston ( <i>Dr. Shepherd's Library, the Institution, Acenham</i> ).             |
| Falmouth ( <i>Public Library, Church Street</i> ).                                               | Reading ( <i>Literary, Scientific, and Mechanics' Institution, London St.</i> ). |
| Gateshead.                                                                                       | Rochdale ( <i>Commissioners' Room, Smith Street</i> ).                           |
| Gorton ( <i>Railway Station</i> ).                                                               | Rotherham ( <i>Board of Health Offices, Howard Street</i> ).                     |
| Glasgow ( <i>Stirling's Library, Miller Street</i> ).                                            | Salford ( <i>Peel Park</i> ).                                                    |
| Grimsby, Great ( <i>Mechanics' Institution, Victoria Street</i> ).                               | Sheffield ( <i>Free Library, Surrey Street</i> ).                                |
| Hanley, Staffordshire ( <i>Potteries, Town Hall</i> ).                                           | Shrewsbury ( <i>The Public Museum, College Street</i> ).                         |
| Hartlepool, West ( <i>Literary and Mechanics' Institute, Church Street</i> ).                    | Society of Arts ( <i>John Street, Adelphi</i> ).                                 |
| Hertford ( <i>Public Library, Town Hall</i> ).                                                   | Southampton ( <i>Corporation Library, Audit House</i> ).                         |
| Huddersfield ( <i>Commissioners' Offices, No. 1, South Parade</i> ).                             | Stirling ( <i>Burgh Library, Town House Broad Street</i> ).                      |
| Hull ( <i>Mechanics' Institute, George Street</i> ).                                             |                                                                                  |
| Ipswich ( <i>Museum Library, Museum Street</i> ).                                                |                                                                                  |
| Keighley ( <i>Mechanics' Institute, North Street</i> ).                                          |                                                                                  |



Stockport (*Court House, Vernon Street, Warren Street*).  
 Sunderland (*Corporation Museum, Athenæum, Fawcett Street*).  
 Wakefield (*Mechanics' Institution, Barston Square*).  
 Warrington.  
 Waterford (*Town Hall, The Mall*).  
 Wednesbury (*Board of Health Offices*).

Wexford (*Mechanics' Institute, Crescent Quay*).  
 Wigan.  
 Wolverhampton (*School of Practical Art, Darlington Street*).  
 Wolverton (*Railway Station*).  
 Yarmouth, Norfolk (*Public Library, South Quay*).  
 York (*Lower Council Chamber, Guildhall*).

The Commissioners' publications have also been presented to the following Public Offices, Seats of Learning, British Colonies, and Foreign States :—

#### *Official.*

Admiralty, Steam Department.  
 ——— Surveyor of Navy.  
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 ——— Portsmouth Ditto.  
 ——— Chatham Ditto.  
 ——— Pembroke Ditto.  
 Artillery Institute, Woolwich.

Board of Trade, Whitehall.  
 Small Arms Factory, Enfield.  
 Ordnance, Pall Mall.  
 War Office, Pall Mall.  
 School of Mines, Jermyn Street.  
 Dublin Castle, Dublin.  
 Rolls Office, Chancery (Four Courts), Dublin.  
 Office of Chancery, Edinburgh.  
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#### *Seats of Learning.*

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#### *Foreign States.*

Austria—Handels Ministerium, Vienna.  
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 France—Bibliothèque Impériale,  
     Conservatoire des Arts et Métiers,  
     Hôtel de Ville, } Paris.  
 Hanover—Ministerium des Innern, Hanover.  
 Netherlands—Ministère de l'Intérieur, the Hague.  
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 United States—The Patent Office, Washington.  
     The Astor Library, New York.  
     The State Library, Albany.  
     The Franklin Institute, Philadelphia.  
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 Wurtemberg—Bibliothek des Musterlagers, Stuttgart.

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PATENT RIGHTS in the COLONIES.—Abstract of Replies to the Secretary of State's Circular Despatch of July 11, 1856, calling for Information as to the form of the application to be made by persons desirous of obtaining Patent Rights in the Colonies, and the expenses attendant on the Grant of such Patent Rights. Price 2s. 6d.

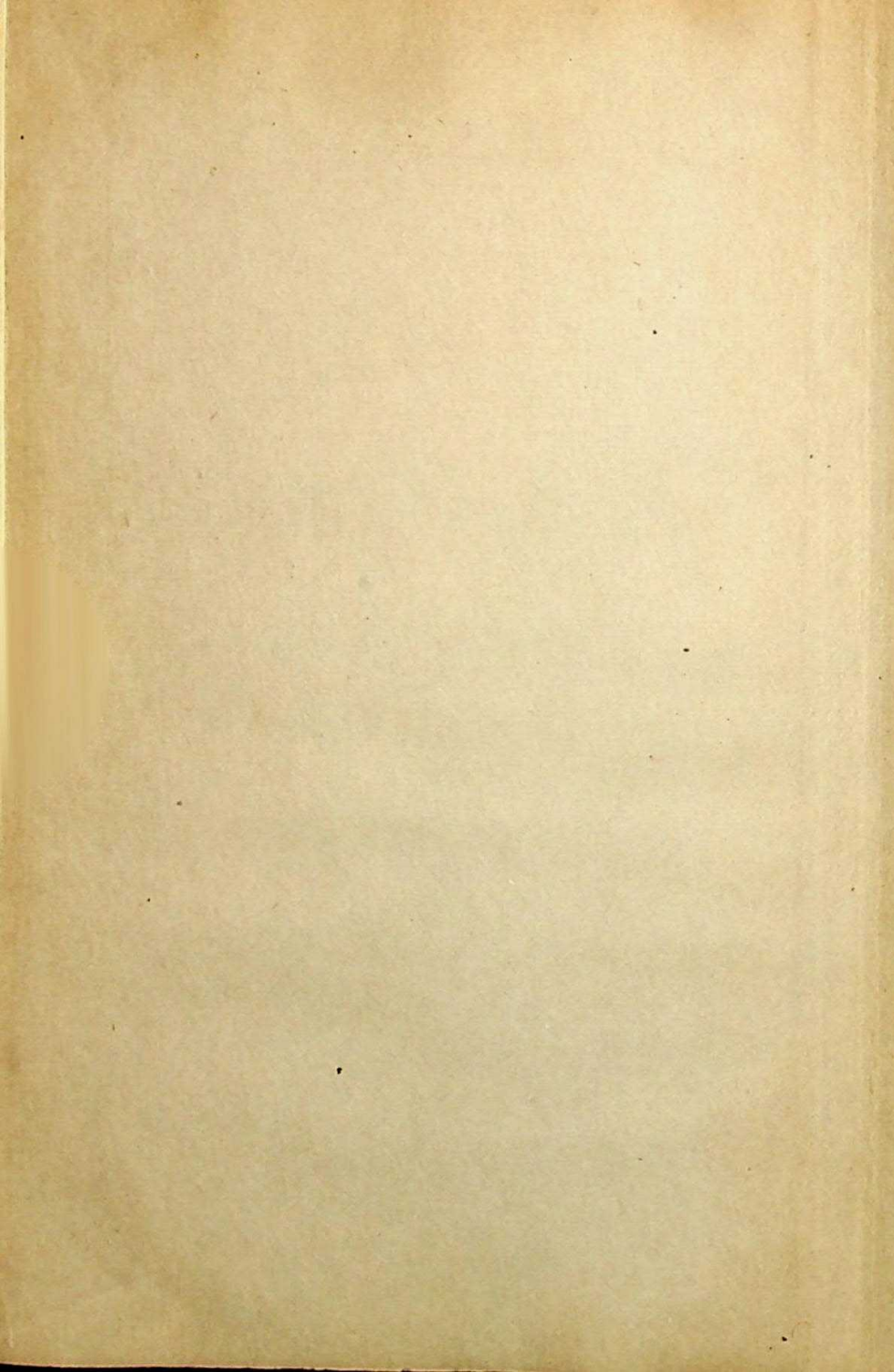
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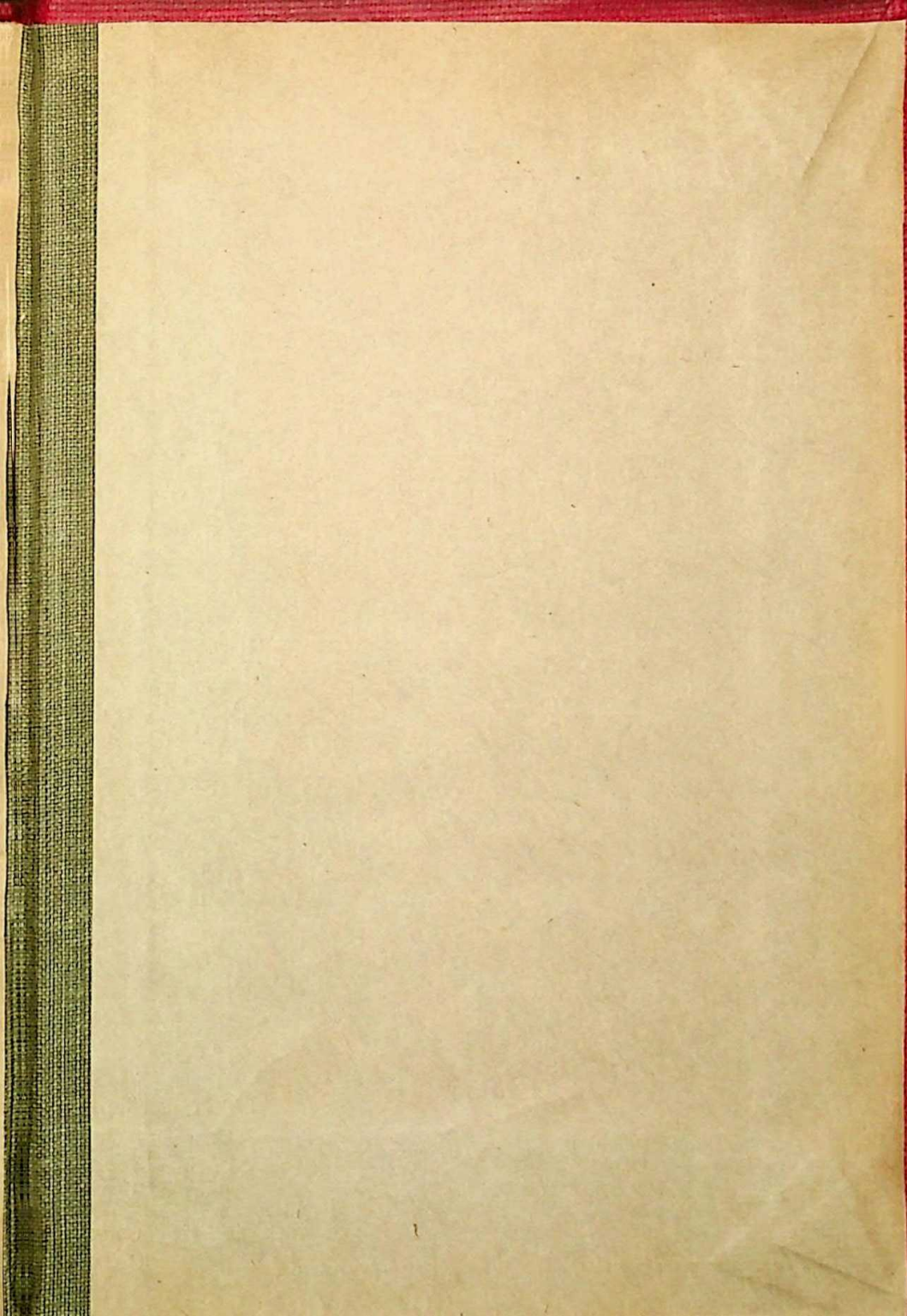
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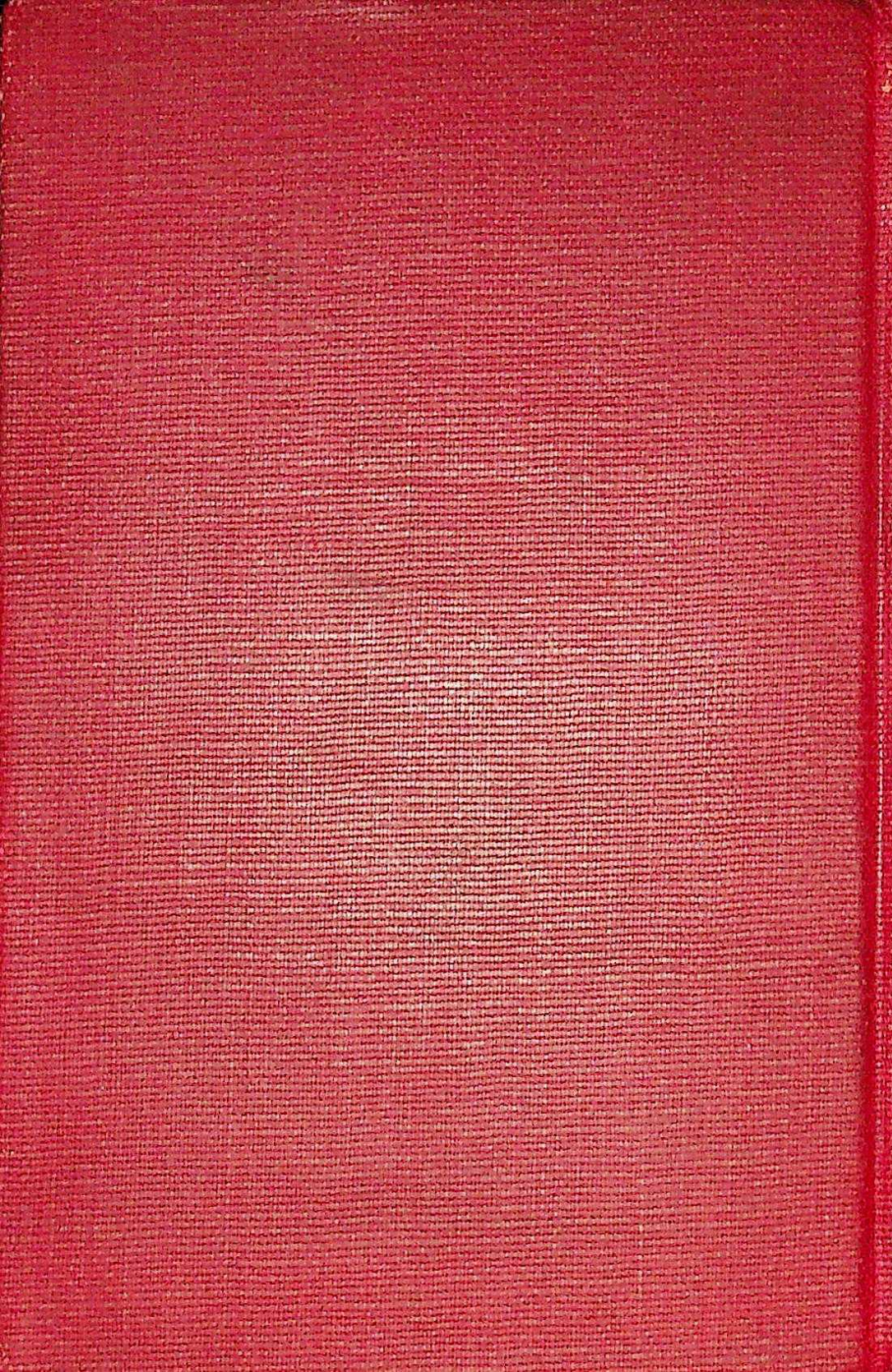














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